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# WAR IN EUROPE





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**WAR IN EUROPE.** The various aspects of the great war which broke out in 1914 will be discussed under the following captions:

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- Military Alliances
- Economic Causes

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## I. UNDERLYING CAUSES OF THE WAR

In July, 1914, the murder of Francis Ferdinand, a member of the Austrian royal family, set in motion a train of events which culminated in the terrible catastrophe of a great European war. It was clear, however, that this crime was not the real cause of the tremendous struggle which many of the statesmen and diplomats of Europe had anticipated and all had feared for many years. The underlying causes of this great War of the Nations reach far back into the past and cannot be reduced to any simple formula. Some knowledge of the important political and economic forces which have shaped the history of Europe during the past century is necessary for an adequate appreciation of the

causes of the great cataclysm. Among the many and complex influences which have been suggested as causes of the war, there are three forces which appear to have contributed most directly in bringing about the critical situation in Europe in 1914. These were (1) the clashing of national interests and ideals, (2) the maintenance of a system of military alliances, and (3) the economic rivalry among the nations of Europe.

**National Antagonisms.** Viewed broadly, the political history of Europe in the nineteenth century centres about two movements which were the inheritance of the French Revolution and the Napoleonic wars, (1) the growth of democracy and (2) the realization of national liberty. When the diplomats of the Great Powers met at the Congress of Vienna in 1815 to readjust the map of Europe, many expressed the hope that the Congress would be guided in its work by these two principles. There was much talk of "the reconstruction of the moral order," "the regeneration of the political system of Europe," of the establishment "of an enduring peace founded on a just distribution of political forces," and of the formation of an effective and permanent international tribunal. Unfortunately these fair promises were not realized and the Congress, instead of establishing a new era, did its utmost to restore the old one. The principles of popular freedom and national liberty were ignored wherever it was necessary to do so to satisfy the dynastic and personal influences which dominated the Congress.

In the first place, as an inheritance of the French Revolution these principles were anathema to the reactionaries and, in the second place, Metternich (q.v.), the Austrian Chancellor who dominated the Congress, realized that encouragement of the nationalist principle would endanger the heterogeneous Austrian dominions. (See VIENNA, CONGRESS OF.) There remained, at the close of the nineteenth century, a number of situations which clearly violated the principle of national sovereignty. The completion of German unity in 1871 was accompanied by the violation of the principle of French nationality in the annexation of the territories of Alsace (q.v.) and Lorraine (q.v.). (See FRANCO-GERMAN WAR.) It was an ever present challenge to the French people to attempt to regain these lost provinces and a constant reminder of the humiliation which they had suffered at the hands of Germany. On the other hand it was used by Bismarck (q.v.) and the Prussian military party to justify their programme of huge military armaments in Germany.

Nowhere else in Europe was the problem of nationality so acute during the nineteenth century as in Austria-Hungary. The very existence of the Austro-Hungarian Monarchy has been a constant challenge to the principle of nationality. Logically carried out this principle would mean the disappearance of Austria-Hungary and the distribution of its territory among the surrounding nations. The appreciation of this fact by the Austrian authorities made them apprehensive of all nationalist movements, and especially that of the southern Slavs. As will be seen it was the outgrowth of one of these movements which precipitated the crisis which led to the outbreak of the war.

The Balkan states presented a peculiarly vexing problem in the realization of the principle of nationality. The intricate mixture of racial

groups in this region made it an almost hopeless task to arrange geographical boundaries to correspond with national lines. The problem was complicated, moreover, by the clashing of the interests of the great European Powers, especially Austria and Russia, in this territory. The condition of chronic disorder and strife in this region during the nineteenth century was a source of almost constant concern to the diplomats of the great European states.

While the triumph of the ideal of nationality has done much to advance European civilization, it has not been an unmixed blessing. Too often national patriotism became a fetish. Love of one's country meant a lack of appreciation of or a contempt for the people of other countries; a feeling that the "kultur" of one's country was not only different from but distinctly superior to that of any other country. From this it naturally followed that it was a laudable ambition to wish to impose one's superior civilization upon an inferior people.

"If it were possible," says Prince Bernhard von Bülow (q.v.) in his book on *Imperial Germany*, "for members of different nationalities, with different language and customs, and an intellectual life of a different kind, to live side by side in one and the same state, without succumbing to the temptation of each trying to force his own nationality on the other, things on earth would look a good deal more peaceful. But it is a law of life and development in history that where two national civilizations meet they fight for ascendancy. In the struggle between nationalities, one nation is the hammer and the other the anvil; one is the victor and the other the vanquished." Prince von Bülow's words really go to the root of the whole trouble in European politics. They show clearly that exaggerated idea of the inevitable antagonism of national interests which dominated European politics during the nineteenth century.

In its extreme form this national spirit has found expression in movements to unite various related ethnic and racial groups into one political group. Such movements have been more or less prominent in Germany, Russia, and the Balkan states under the names Pan-Germanism, Pan-Slavism (q.v.), Pan-Serbianism, etc. It is doubtful whether any of these movements had passed beyond the state of vague aspirations held by a comparatively small group of people. As a contributing cause of the war the Pan-Slavic and Pan-Serbian movements were of some importance. The growth of such propaganda was a source of concern to Austria-Hungary, with its large Slavic population.

**Pan-Germanism.**—The Pan-German movement was an outgrowth of German imperialism and of the exaggerated race consciousness of the Germans. Roughly stated, this movement conceives the German people wherever located as forming one great nationality. Some Pan-Germanists deny any political or territorial ambitions and assert that they wish merely to spread the knowledge of German culture throughout the world. Others, more radical, proclaim the ultimate domination of the world by the German race. The German authorities have repeatedly stated that the Pan-German movement has no official sanction and that it is the work of only a very small part of the German people. However, what the movement has lacked in numbers it has made up in activity. Prominent historians, scientists, and other writers have ex-

pounded its views, while numerous societies have been formed to advance German ideas of culture and civilization throughout the civilized world.

**Military Alliances.** The obsession of national jealousy led inevitably to the view that it was necessary to defend nationalism with huge armaments. The remarkable success of Bismarck in uniting Germany by a policy of blood and iron was used as an object lesson by the militarists of Germany and other nations. War was glorified as an institution in itself, not simply as a means to an end. Says Bernhardt,\* one of the leading exponents of this school, "War is in itself a good thing. It is a biological necessity of the first importance." And again, "The inevitableness, the idealism, the blessing of war as an indispensable and stimulating law of development must be repeatedly emphasized." John Adam Cramb,† an English historian, predicted a war between Germany and England and warned England to prepare for it. Everywhere the doctrine of military preparedness was advocated and it bore fruit in the tremendous standing armies and huge navies of the different European countries. It led also to the grouping of the great European Powers into two hostile military alliances.

When the representatives of the European Powers met at the Congress of Vienna in 1815, there was organized the so-called Concert of Europe, by which it was hoped that the problems of European politics would be adjusted. For some years Congresses representing the Great Powers were held at which international questions were considered and efforts made to maintain the balance of power in Europe. After the middle of the nineteenth century, however, the influence of this Concert was materially weakened.

A political transformation of Europe occurred in the decade between 1860 and 1870, culminating in the creation of two new European states, Germany and Italy. The appearance of these two states in the family of European nations seriously disturbed the old political relations. Bismarck, who had been largely instrumental in the creation of the German Empire, adopted as his guiding principle a system of firm alliances rather than dependence upon the more loosely constituted European Concert. In an effort to isolate France, he first strove to unite Russia, Germany, and Austria in a defensive alliance. When Russia withdrew from this alliance on account of antagonism to Austria, Bismarck devoted his efforts to binding together more closely the two Teutonic Powers. Italy later (1882) joined with the Central Powers to form the Triple Alliance (q.v.).

This organization of the states of central Europe into a strong military alliance was an

invitation to the other states of Europe to create an opposing alliance in order to maintain the balance of power. First France and Russia, drawn together by mutual hostility to Germany, formed a Dual Alliance (1895) and finally Great Britain, aroused by the threatening naval policy of Germany, abandoned her policy of "splendid isolation," and joined with France and Russia to form a second diplomatic group known as the Triple Entente (q.v.). The formation of these two rival military groups created a situation in Europe where every disturbance of the political or diplomatic status quo brought on a crisis. Since 1905 Europe has passed through several such crises, each one increasing the tension among the Great Powers and each making the maintenance of peace more difficult.

The first of these crises came in 1905 in a dispute over Morocco. A part of the understanding reached between England and France in 1904 provided that France should have a free hand in Morocco, while England was given a free hand in Egypt. Germany, which had abandoned Bismarck's policy of opposition to colonial expansion, was looking about for such stray portions of undeveloped land as had not been appropriated by England and France. Germany had to choose between two courses. Either she could frankly recognize the inevitable consequences of her geographical position and her late entrance into the field as a colonial power, which handicapped her development as a world state, or she might determine to challenge the more fortunately situated and longer established world Powers and create for herself a larger "place in the sun." She chose the latter alternative. With a rapidly increasing population, it became a question whether even her remarkable industrial development would accommodate the added millions of population. It is true that at this time Germany imported unskilled agricultural labor from Russia, and that there was no alarming emigration from Germany. But the future held out the prospect of a large emigration of Germans to other countries, and the Germans resented the loss of this good German stock to the Fatherland. Colonies where Germans might be kept under German control were felt to be the great need. Germany therefore determined not to stand quietly by and allow further colonial acquisitions by the other great European Powers without making an effort to share in the spoils.

The Russo-Japanese War (q.v.) (1904-05) had revealed the military weakness and inefficiency of Russia. This situation made Russia's support of France much less valuable and Germany felt that it was an opportune time to assert her position in regard to Morocco. On March 21, 1905, the German Emperor, while on a voyage to Constantinople, disembarked at Tangier and encouraged the Sultan to reject the scheme of reforms proposed by France. He, moreover, succeeded in forcing France to submit the whole Moroccan question to a conference of the Powers held at Algiers (see MOROCCO, *History*), in January, 1906. England firmly supported France and let it be known that any interference with France's predominant position in Morocco would be resisted by her. Italy, moreover, refused to support her ally, with the result that France scored a distinct diplomatic victory.

One phase of Germany's policy of colonial and commercial expansion contemplated the exten-

\* Friedrich von Bernhardt, born (1849) at St. Petersburg, son of a German diplomat; served in Franco-Prussian War; general of cavalry and commander of the Seventh Army Corps (1908); retired (1909), but in 1915, during the European War, assigned to field command at his own request. His writings, for which he is known internationally, are concerned with German military progress and with an expected war for the advancement of Pan-Germanism and expansion. In English have appeared: *Cavalry in War and Peace* (1910); *On War of To-Day, Britain as Germany's Vassal, and Germany and the Next War* (all 1914); *The New Bernhardt: "World Power or Downfall"* (1915), a collection of articles written during the European War.

† John Adam Cramb (1862-1913), educated at Glasgow and Bonn; from 1893 to his death professor of modern history at Queen's College, London; also lectured at other institutions and gave private courses; author of *Germany and England* (1914) and *The Origins and Destiny of Imperial Britain and Nineteenth Century Europe* (1915).

sion of Teutonic commercial and political interests in the Balkans and Turkey. In this "Drang nach Osten" Germany, in conjunction with Austria, hoped to create a great economic, if not political, sphere of influence extending through the Balkans to Constantinople and thence through Turkey in Asia to the Persian Gulf. German engineers and German capitalists began to develop Turkish resources. German military officials trained the Turkish forces.

In July, 1908, a revolution, led by the Young Turks, broke out in Constantinople. Taking advantage of this situation Bulgaria annexed eastern Rumelia and declared her complete independence of Turkey. Austria felt the time opportune to annex Bosnia and Herzegovina, which had been placed under her administration in 1878 by the Congress of Berlin (q.v.). This action of Austria irritated Italy and aroused Serbia, which latter had hoped to bring these provinces, closely related to her in blood, into a Greater Serbia. Russia protested against Austria's violation of the Treaty of Berlin, but Germany stood by her ally, and Russia unprepared for war was forced to submit. The Teutonic allies had scored a distinct diplomatic success and another European crisis was passed.

Once again in 1911, the Moroccan question brought Europe to the verge of war. Germany had not accepted with good grace her diplomatic defeat at Algeiras, and watched with an increasing irritation the extension of French influence and control in Morocco. Germany complained that France was not observing the policy of equal commercial opportunity for all nations and on July 1, 1911, the German cruiser *Panther* appeared off Agadir. Both England and France likewise sent ships there, and for several months European peace hung in the balance. A compromise was finally reached whereby Germany recognized France's predominant position in Morocco while in return Germany received a part of the French Congo.

Hardly had this second Moroccan crisis been passed when the delicate balance in European politics was disturbed by the Turco-Italian War (q.v.). Disappointed in her desire to obtain Tunis, Italy turned her attentions to the neighboring Turkish province of Tripoli and gradually extended her economic interests there. Friction developed with the corrupt and inefficient Turkish authorities and in September, 1911, the Italian government demanded that Turkey place the provinces of Tripoli and Cyrenaica under Italian control. Upon Turkey's refusal Italy declared war and after a long campaign succeeded in occupying the territory. Germany was placed in the difficult position of seeing her protégé Turkey despoiled by her ally Italy. She was, however, powerless to prevent Italy from carrying through her designs for fear that the latter might desert the Triple Alliance and join the Entente.

The Turco-Italian War was a prelude to a much more serious and far-reaching upheaval in the Turkish dominions. The policy of the Young Turks after the revolution of 1908, in attempting to build up a strong, unified Ottoman nation, stirred the smoldering embers of the rival nationalities in the Balkans. The Greeks, Bulgarians, Serbs, and Montenegrins resented the attempt to Ottomanize their fellow nationals in Macedonia and Albania. Putting aside for the moment their own rivalries these four Powers organized the Balkan League, and submitted

to Turkey a demand for far-reaching reforms in Macedonia. The European Powers quickly saw the danger of a European war if the Balkan situation was disturbed and they served notice on the Allies that under no conditions would they allow a modification of the territorial status quo in the Balkans. Undeterred by this threat of European intervention the Allies declared war on Turkey in October, 1912 (see BALKAN WAR), and after a series of brilliant campaigns, completely routed the Turks and drove them to the gates of Constantinople. As the Allies had anticipated, the European Powers did not make good their threat to restore the status quo. When it came to a division of the spoils the old rivalries among the Allies once more appeared. Serbia had been thwarted in her desire to obtain Albania by the opposition of Italy and Austria. This led to a demand by Serbia for a modification of the agreement for the divisions of the territory made by the Allies before the war. To this Bulgaria would not consent and Serbia, Greece, and Montenegro combined against their former ally. Rumania and Turkey also joined Bulgaria's enemies with the result that Bulgaria's forces were quickly overwhelmed. The struggle closed in August, 1913, and Bulgaria was forced to give up a large part of the conquered Turkish territory.

The outcome of the Balkan wars was a bitter disappointment to Germany and Austria. Not only had their protégé Turkey been practically driven from Europe, but the creation of a greater Serbia and the strengthening of Greece and Bulgaria checked the plans of Austria to reach the Aegean Sea at Saloniki. Russian influence, too, had been greatly increased in the Balkans by the strengthening of the Slavic states.

That Germany appreciated the serious blow which had been dealt to Teutonic influence in the Balkans was indicated by the introduction in February, 1913, of a new army bill which increased the peace strength of the German army by more than 100,000 men, and 19,000 officers. This was defended on the ground that the outcome of the Balkan wars had seriously disturbed the balance of power in central Europe to the detriment of Austria and Germany. France retaliated by increasing the term of military service in the French army from two to three years. Similar moves were made in Russia where it was proposed to increase the term of military service from three to three and one-quarter years, and in Austria where the standing army was increased by 100,000 men.

Thus at the opening of the year 1914, Europe was an armed camp. The Great Powers organized into two rival military alliances watched each other, waiting for the inevitable conflict.

**Economic Causes.** Some advocates of the economic interpretation of history seek to place all historical facts on an economic basis. To this school of historical writers this war is explained almost entirely on economic grounds. While it is quite possible to exaggerate this economic motive, there is no question that economic considerations played an important part in bringing about the situation which precipitated the European crisis. Some of these economic influences may be briefly stated.

At the close of the eighteenth century there occurred in Europe a complete transformation of industrial conditions known as the industrial revolution. The invention of improved

methods of spinning and weaving, the application of steam power, the substitution of the factory system for the former method of cottage industry, and the appearance of distinct capitalist and laboring classes were the most striking features of this revolution in industrial life.

England was the first country to feel the effects of this change. Factories began to turn out large quantities of manufactured commodities, more than enough to supply the home market. For a time England had a practical monopoly of the field, and had no difficulty in disposing of her surplus products in the markets of the world. But the industrial revolution in time reached other countries; France in the period after 1830, the United States in the period following the Civil War, and Germany in the period after 1880. The great industrial interests in these countries began to compete with those of England for the control of the markets of the world. England had the advantage of having vast colonial possessions which might serve both as a market for her manufactured products and as a field for the investment of surplus capital in the development of their natural resources. France and the United States, in a lesser degree, also enjoyed this advantage. Germany, on the other hand, because of her late appearance as a great power, was practically without colonial possessions of any potential value. She felt that her industrial development was being hampered through no fault of her own, but simply because the best parts of the world had been appropriated by other countries.

It has been argued, with considerable force, that a nation does not benefit commercially by the control of colonies or weak states. The case of Germany is cited to show how marvelously a state may expand commercially without colonies. But there is no doubt that certain economic interests within a nation do gain by national control of undeveloped parts of the world. There are government contracts to be let, franchises to be given, concessions to be granted, and possibly preferential tariffs to be established. The financial interests in close touch with the governmental authorities of a great power undoubtedly have a great advantage.

In the different crises which preceded the outbreak of the war it is urged, with much force, that economic considerations were predominant. German apologists insist that Great Britain welcomed the war as an opportunity to crush a dangerous commercial rival. It was pointed out that the adoption of preferential tariffs by the British colonies favoring British trade was an attempt to cripple German trade. The Moroccan disputes, it is maintained, were primarily due to the influence of German financial interests which felt that they were being discriminated against by the French authorities.

As to the Balkans, it is claimed that the economic rivalry of Austria (backed by Germany) and Russia was responsible, quite as much as the racial rivalry, for the state of chronic disorder in this region. It is maintained that the creation of the State of Albania at the end of the second Balkan War was primarily due to Austria, which country wished to thwart Serbia's effort to reach the sea and thus free herself from Austria's control of much of her export trade.

Again, the belief was prevalent in England that the forces behind the movement for the creation of a large German navy were the prominent financial interests which hoped to

use this new weapon to overthrow British commercial supremacy. In Turkey the extension of German financial interests in the years preceding the war occasioned rivalry with similar interests of France and England. Finally it is asserted that the economic interests which would materially benefit by a war, such as the manufacturing of arms and ammunition, had deliberately fostered the national antagonism in Europe. Much color was given to this charge by the revelations made in 1913, by Karl Liebknecht (q.v.), the Socialist leader in the German Reichstag. It was shown that the Krupps, the famous gun and ammunition makers, had regularly subsidized French newspapers to print inflammatory articles against Germany, in order to stimulate the hostility between these countries. It is difficult to estimate with any degree of accuracy just how much weight is to be assigned to these various economic factors as a cause of the war. That their influence was considerable there would seem to be little doubt.

## II. OUTBREAK OF THE WAR

On June 28, 1914, the Archduke Francis Ferdinand (q.v.) and hismorganatic wife the Duchess of Hohenburg were assassinated by Serbian sympathizers while on an official visit to the town of Serajevo, the capital of Bosnia. It was generally believed in Austria that the crime was instigated by Pan-Serbian agitators, who had maintained a persistent propaganda for the acquisition of the provinces of Bosnia and Herzegovina ever since they had been annexed by Austria in 1908. These provinces had once formed part of the old Serbian Empire, and about half of the population was related to the Serbs in race and speech. Despite the fact that Serbia had agreed in 1909 to recognize the annexation of these provinces by Austria as a *fait accompli*, the Pan-Serbian movement was allowed to continue in Serbia, unhampered by the government authorities.

In Austria this movement was resented for two reasons. In the first place, Serbia had emerged from the second Balkan War doubled in size, and any further strengthening of this country ran counter to Austria's commercial interests in the Balkans. As it was, Serbia stood in the way of Austria's realizing her ambition of reaching the Aegean Sea at Saloniki. In the second place, the Pan-Serbian movement was a positive danger to the integrity of the Austrian Empire. If successful, it might encourage other racial groups within the Empire to disrupt completely the Hapsburg dominions. Austria had therefore good reasons for regarding the Pan-Serbian propaganda with fear and resentment. Investigations carried on by the Austrian officials at Serajevo led to the conclusion that the assassination of the Archduke had been planned by the conspirators at Belgrade and that the pistols and bombs used had been smuggled into Bosnia from Serbia with the connivance of Serbian officials. Having established these alleged facts, the Austrian government felt justified in proceeding in the most summary manner to crush once and for all the Pan-Serbian movement. With this in view there was presented to Serbia, by Austria, on July 23, 1914, an ultimatum couched in the most vigorous language. Count Berchtold (q.v.) was the Austrian Foreign Minister.

The note began by recalling the declaration made by Serbia on the 31st of March, 1909,

wherein Serbia recognized the *fait accompli* regarding Bosnia and agreed to renounce any attitude of protest or opposition to the annexation of Bosnia by Austria. The Austrian note then went on to complain that Serbia had not lived up to this undertaking, and had made it necessary for Austria to take action to protect herself against the Pan-Serbian propaganda. Austria insisted that Serbia should make an official and public condemnation of this propaganda and express regret at its consequences.

The note then submitted ten specific demands and required an answer from Serbia by six o'clock on Saturday evening, July 25, within 48 hours of its presentation.

These demands required that Serbia should suppress every publication which excited hatred of the Dual Monarchy; that the Serbian government dissolve certain societies accused of fomenting the propaganda hostile to Austria; that teachers guilty of instigating hatred of Austria be dismissed and that objectionable matter in the textbooks be eliminated; that Serbia dismiss from her army and governmental employ all officers and officials found taking part in the propaganda; that Serbia accept the collaboration of agents of the Austro-Hungarian government in suppression of the subversive movement against Austria; that Austro-Hungarian representatives be allowed to take part in the investigation of persons in Serbia accused of complicity in the murder of the Archduke; that Serbia take action against two specified officials, who were accused of complicity in the crime at Serajevo; that Serbia take effective measures to stop the smuggling of arms and ammunition across her border; and finally that Serbia give explanation of the expressions of hostility toward Austria-Hungary on the part of certain high Serbian officials.

The publication of this note immediately aroused great apprehension in the chancelleries of the European Powers. It was clear that Europe was confronted with another serious crisis.

It is a striking fact that each of the Powers of the Triple Entente was confronted by serious internal difficulties at this most critical time. Great Britain was threatened by serious disturbances in Ireland resulting from the passage of the Home Rule Bill (see IRELAND); St. Petersburg was involved in a great strike; in France the Caillaux affair (see FRANCE) had affected seriously the prestige of the government and the Minister of War declared that the army was in a deplorable state of unpreparedness.

The first move of Sir Edward Grey (q.v.), the British Foreign Secretary, was to urge upon Austria-Hungary the necessity of extending the time limit of the ultimatum. In this he was strongly supported by M. Sazonov, the Russian Foreign Minister. Germany, however, was not inclined to bring pressure upon her ally in this matter and Austria flatly refused any extension of time.

Failing in this move, the British and Russian Ministers turned their efforts to persuading Serbia to accept, as far as possible, the demands made by Austria. In this they were largely successful.

**The Serbian Reply.** Serbia's reply to the Austrian ultimatum was handed to the Austrian Minister at Belgrade on July 25, only two minutes before the expiration of the time limit. The reply began by stating that the Serbian govern-

ment was not aware of any official action since 1909 protesting against the political status of Bosnia-Herzegovina, and that the only representation made by Austria, that concerning a school book, had been explained to the satisfaction of the Austrian government. To this the Austrian government replied in an official rejoinder that it was not sufficient to indicate that there had been no official action against Austria. It was the failure of Serbia to use energetic measures to suppress unofficial agitation directed against the territorial integrity of Austria of which complaint was made.

The Serbian reply further stated that the Serbian government did not consider that they could be held responsible for the opinions expressed by private individuals, such as articles appearing in the press and the peaceful proceedings of societies. Serbia agreed, however, to amend her constitution to permit the enactment of legislation to suppress such publications. Most of the other demands were agreed to by Serbia with slight verbal changes. There were two points, however, with which Serbia did not comply. In the first place, to the demand that Serbia accept the collaboration of agents of the Austrian government in the suppression of the subversive movement directed against the territorial integrity of the Dual Monarchy, Serbia replied that she did not understand exactly the meaning of the demand, but that she was ready to accept such collaboration as should conform to the principles of international law and criminal procedure. The Austrian rejoinder stated that it was not a question of international law but of the exercise of police powers which could be settled by agreement between the parties concerned. In the second place the demand made by Austria that Austrian officials be permitted to take part in the investigation relating to the judicial proceedings in Serbia against persons involved in the Serajevo crime, the Serbian government would not concede on the ground that such action would violate the Serbian constitution. The Austrian rejoinder accused the Serbian government of deliberately misrepresenting the Austrian demand, which contemplated simply a participation in the preliminary investigation to the judicial proceedings. Finally the Serbian government agreed, in case the Austrian government should find the reply unsatisfactory, to submit the disputed questions to The Hague Tribunal or the Great Powers for decision.

The representatives of the Entente Powers were satisfied that Serbia's reply was a substantial agreement to the Austrian demands. Austria, however, claimed to find the reply wholly unsatisfactory and in this view she was apparently supported by Germany.

From the time of the presentation of the Austrian ultimatum, it was recognized on all sides that the great danger was that any move on the part of Austria would precipitate a general European war. The delicate balance of interests in the Balkans could not be disturbed without involving serious consequences. Russia in particular felt that she was deeply interested in the fate of the small Slav nations in the Balkan Peninsula. The Russian Ambassador at Vienna stated on July 24 that "any action taken by Austria to humiliate Serbia could not leave Russia indifferent." (B.W.P. No. 7.) At Berlin, too, it was clearly recognized that Austria's action would probably involve Russia.

The German memorandum states that Germany was fully aware that "warlike moves on the part of Austria-Hungary against Serbia, would bring Russia into the question and might draw Germany into a war in accordance with her duty as Austria's ally." (G.W.B. p. 4.) \*

Despite Austria's assurance that she had no intention of annexing Serbian territory or disturbing the balance of power in the Balkans, Russia felt that, apart from the acquisition of territory, the crushing of Serbia would reduce her to a vassal state of Austria, and that this would imperil the balance of power in the Balkans. In view of this situation the Russian Foreign Minister stated that Russia would mobilize against Austria on the day that the Austrian army crossed the Serbian frontier. (B.W.P. No. 72.)

This determined attitude of Russia made any efforts which the Powers might make to localize the struggle futile. The next question of vital interest was the attitude which Germany would take. How far was she prepared to support her ally Austria in her uncompromising position towards Serbia? In defining its position the German government declared "The attitude of the Imperial government in this question is clearly indicated. The agitation carried on by the Pan-Slavs in Austria-Hungary has for its goal the destruction of the Austro-Hungarian Monarchy, which carries with it the shattering or weakening of the Triple Alliance and, in consequence, the complete isolation of the German Empire. Our nearest interests, therefore, summon us to the support of Austria-Hungary." (G.W.B. exhibit 2.) And further "A morally weakened Austria under the pressure of Pan-slavism would be no longer an ally on whom we could count and in whom we could have confidence, such as we must have, in view of the increasingly menacing attitudes of our neighbors on the east and west." (G.W.B. memo. p. 5.) It is clear therefore that Germany felt that her interests as well as those of Austria were vitally affected. It was generally believed, and openly stated, that Germany knew the nature of the Austrian ultimatum to Serbia before it was sent and had urged Austria to precipitate a crisis by presenting demands which Serbia would not accept. This was categorically denied by the German authorities. (B.W.P. No. 25.) Nevertheless Germany thoroughly approved of the Austrian demands and insisted that the quarrel should be considered simply as an affair between Austria and Serbia.

Obviously it was of the utmost importance to prevent, or at least delay, the first hostile move by Austria against Serbia. On July 26, Sir E. Grey suggested a conference of the representatives of the four Powers, England, France, Germany, and Italy, for the purpose of discovering an issue which would prevent complications between Austria and Russia. (B.W.P. No. 36.) To this suggestion France and Italy agreed. Germany, however, declined to fall in with this plan. The German Foreign Minister stated that "a conference such as Sir E. Grey suggested would amount to a court of arbitration and could not, in his opinion, be called together except at the request of Austria and Russia" (B.W.P. No. 43); and furthermore that "he

did not think it [the conference] would be effective, because such a conference would in his opinion have had the appearance of an Areopagus consisting of two Powers of each group sitting in judgment upon the two remaining Powers." (B.W.P. No. 71; G.W.B. memo. p. 8.)

Direct negotiations between Russia and Austria were unsuccessful, Austria refusing to consider a modification of the terms of her ultimatum to Serbia. (B.W.P. No. 93; R.O.B. No. 45.) Further efforts on the part of England to have Germany propose some formula which would be acceptable proved unavailing (B.W.P. No. 111), and on July 28, 1914, Austria declared war on Serbia. This action on the part of Austria appears explicable on one of two grounds. Either she was convinced that Russia was bluffing and would back down as she did in 1908, or else that Austria was prepared deliberately to precipitate a European war.

**Germany and Russia.** The Russian government had very definitely declared that Russia could not remain indifferent to the fate of Serbia. It was generally believed in Russia that Austria's action was directed against her quite as much as against Serbia. (R.O.B. No. 75.) Consequently on July 29, 1914, Russia declared partial mobilization against Austria-Hungary. At the same time the Russian Foreign Minister stated that this action was in no way directed against Germany. (R.O.B. No. 49.) These military preparations stimulated the diplomats in their final efforts to find some solution which would prevent a European conflagration. Various formulas were suggested but none was acceptable. On July 29, Sir E. Grey urged that "the German government should suggest any method by which the influence of the four Powers could be used to prevent war between Austria and Russia. France agreed. Italy agreed. The whole idea of mediation or mediating influence was ready to be put in operation by any method that Germany thought possible, if only Germany would press the button in the interests of peace." (B.W.P. No. 84.) Germany did press the button to the extent of urging Austria to renew negotiations with Russia. At the same time Russia was requested to prepare a formula which would be satisfactory to her. M. Sazonov accordingly submitted the following suggestion: "If Austria, recognizing that her conflict with Serbia has assumed the character of a question of European interest, declares herself ready to eliminate from her ultimatum points which violate the principle of the sovereignty of Serbia, Russia engages to stop all military preparations." This formula was wholly unsatisfactory to Germany and Austria, and at the suggestion of Sir E. Grey the Russian formula was modified to read: "If Austria will agree to check the advance of her troops on Serbian territory; if, recognizing the fact that the dispute between Austria and Serbia has assumed a character of European interest, she will allow the Great Powers to look into the matter and determine whether Serbia could satisfy the Austro-Hungarian government without impairing her rights as a sovereign state or her independence, Russia will undertake to maintain her waiting attitude."

One final effort was made by England and Germany to prevent a break between Austria and Russia. Sir E. Grey, on July 31, said that if Germany would suggest any reasonable proposal which would preserve peace, and if France

\* In referring to the official documents the following abbreviations are used: British White Paper, B.W.P.; German White Book, G.W.B.; Austrian Red Book, A.R.B.; Russian Orange Book, R.O.B.; French Yellow Book, F.Y.B.; Belgian Gray Book, B.G.B.; Italian Green Book, I.G.B.



and Russia rejected such a proposal, Great Britain would not support them, but on the other hand if no such proposal were made and France became involved, Great Britain would be drawn in. (B.W.P. No. 111.) Germany, on her part, brought pressure on Austria to agree to discuss with Russia the terms of the Austrian ultimatum, and at the last moment, on July 31, Austria agreed to do so. (A.R.B. Nos. 49-50.) This slim chance of preventing a break at the eleventh hour was nullified by the demand made by Germany that Russia should cease her military preparations and demobilize her army. At midnight on July 31, 1914, the German Ambassador delivered an ultimatum to Russia demanding that she demobilize her forces not only against Germany but also against Austria-Hungary. (R.O.B. No. 70.) As Russia returned no reply to this demand the German Ambassador was ordered on August 1, at 5 P.M., to notify the Russian government that Germany considered that a state of war existed between the two countries. (G.W.B. exhibit 26; R.O.B. No. 76.)

**Germany and France.** At the same time that Germany presented the ultimatum to Russia, a communication was sent to France informing her of Germany's action and asking what attitude France would take in the event of war between Germany and Russia. An answer was demanded within 18 hours. (F.Y.B. No. 116; G.W.B. exhibit 25.) To this demand the French Premier replied on August 1, that "France would take such action as her interests might require." (G.W.B. exhibit 27.) Despite this unsatisfactory answer the German Ambassador did not leave Paris until August 3. In the meantime charges and countercharges were made by the French and German authorities that warlike moves had been made on the frontier.

**Great Britain and Germany.** From the first it was evident that the question of England's attitude in the face of the great European crisis was of the most vital importance. In that most critical week following the presentation of the Austrian ultimatum, Sir E. Grey worked early and late to arrive at some peaceful solution of the difficulty. From the very beginning France and Russia had urged Great Britain to come out with a definite statement that if war was precipitated she would support them, pointing out that such a stand by Great Britain would deter Germany from entering the war. M. Sazonov, the Russian Foreign Minister, said "he did not believe that Germany really wanted war, but her attitude was decided by England's. If she took her stand firmly with France and Russia there would be no war." (B.W.P. No. 17.) The President of France, M. Poincaré (q.v.), went so far as to appeal directly to King George stating "I am profoundly convinced that at the present moment the more Great Britain, France, and Russia can give a deep impression that they are united in their diplomatic action, the more possible it will be to count upon the preservation of peace." Sir E. Grey did not accept their suggestions. It was his view that Great Britain could work most effectively for peace by playing the part of mediator. At the same time he made it clear to the German Ambassador that if Germany and France became involved "the issue might be so great that it would involve European interests and he did not wish him to be misled into thinking that Great Britain would stand aside." (B.W.P. No. 89.) Germany

fully appreciated the importance of keeping Great Britain neutral, if possible. With this end in view the German Chancellor proposed that if Great Britain would remain neutral Germany would guarantee that no territorial acquisitions would be made at the expense of France. He was unwilling, however, to make a similar undertaking in regard to the French colonies. (B.W.P. No. 85.) This suggestion was declined by Great Britain on the ground that France might be so crushed as to lose her position as a great power, without having territory taken from her. Furthermore that other contingencies might arise which would justify Great Britain's entrance into the war. (B.W.P. No. 101.) A further request from Germany that Sir E. Grey formulate conditions on which Great Britain would remain neutral was declined. He stated that "he could only say that they must keep their hands free." (B.W.P. No. 123.) The British government, therefore, up to the very last day of European peace refused either to bind herself to come to the aid of France and Russia or to remain neutral.

**Question of Belgian Neutrality.** The Congress of Vienna in 1815 turned over the Austrian Netherlands, or Belgium, to Holland in compensation for certain Dutch colonial possessions retained by Great Britain. This union was opposed by the Belgians and at the first favorable opportunity (1830) they revolted. France was anxious to annex the provinces but Great Britain, following her traditional policy, opposed their union with any great power. This opposition was due to the proximity of the Belgian coast to her shores and also because of the important commercial interests of Great Britain in these rich provinces, which might suffer if they passed into the hands of some great European power. Great Britain's interests would be best served by erecting Belgium into an independent state and by guaranteeing the permanence of this independent status by making the country perpetually neutral. Accordingly in 1831 the principal European Powers, Great Britain, France, Prussia, and Russia, joined in guaranteeing the independence and perpetual neutrality of Belgium. This treaty was replaced by treaties signed in 1839 after Holland had agreed to recognize Belgian independence. When in 1870, at the outbreak of the Franco-Prussian War, it seemed possible that one or both of the combatants might violate the neutrality of Belgium, a separate treaty was signed between Great Britain and each of the belligerents, by which Great Britain agreed that if either belligerent should violate Belgian neutrality the other could rely upon England as an ally in defense of the treaty of 1839.

When on July 31, 1914, the outbreak of a European war seemed unavoidable, Sir E. Grey telegraphed the British ambassadors at Paris and Berlin to request the French and German governments to state whether they were prepared to respect the neutrality of Belgium so long as no other power violated it. To this the French authorities returned an affirmative answer. The German Secretary of State, however, stated that it was doubtful if Germany could return any reply without disclosing a certain amount of her plan of campaign. On Aug. 2, 1914, the German Minister presented to the Belgian Foreign Minister an ultimatum which stated that Germany had "reliable information . . . of the intention of France to



march through Belgian territory," that it was "an imperative duty for the preservation of Germany to forestall this attack." Germany agreed to evacuate Belgian territory as soon as the war was over and to indemnify Belgium for all damages if she would maintain an attitude of "friendly neutrality." In case of refusal Germany stated that Belgium would be considered as an enemy and the question would be left "to a decision of arms." (B.G.B. No. 20.) To this demand the Belgian government returned a flat refusal and stated that they were "firmly resolved to repulse by every means within their power any attack upon their rights." (B.G.B. No. 22.) At the same time Belgium called upon Great Britain, France, and Russia, as signatories of the treaty of 1839, to carry out the guarantee of Belgian neutrality. In response to this request Sir E. Grey on Aug. 4, 1914, sent an ultimatum to Germany demanding a satisfactory reply to her request that Belgian neutrality be respected and requiring an answer by midnight of the same day. Upon Germany's refusal to give such a guarantee Great Britain declared war on Germany. While the violation of Belgian neutrality was the ostensible reason for Great Britain's declaration of war, she had, as a matter of fact, intervened in the war two days before the dispatch of her ultimatum to Germany. In a speech made in the House of Commons on Aug. 2, 1914, Sir E. Grey stated that he had on that day assured the French government that the British fleet would protect the northern coast of France from any attack by the German fleet. By this act Great Britain had tentatively intervened in the war, and the violation of Belgian neutrality by Germany changed this partial and tentative intervention into full participation in the war.

German authorities clearly appreciated that Germany's action in invading Belgium would arouse public sentiment in most neutral countries and strenuous efforts were made subsequently to justify their action. In a speech in the Reichstag on Aug. 4, 1914, the German Chancellor, Theobald von Bethmann-Hollweg (q.v.), said, "Gentlemen, we are now acting in self-defense. Necessity knows no law. Our troops have occupied Luxemburg and have possibly already entered on Belgian soil. Gentlemen, this is a breach of international law." But other grounds than that of bald necessity have been advanced by German apologists to justify their action. It has been claimed that Prussia, and not the German Empire, signed the treaty of 1839 and hence the latter was not bound by its provisions. To this it has been answered that the German Empire succeeded to the obligations of its component parts and that all treaties survived that were not formally denounced. It has also been stated that the treaty of 1839 was superseded by the treaties of 1870 which latter had lapsed. From the debates in the British Parliament at the time of the proposal of the treaties of 1870 there is no indication that the treaty of 1839 was to be superseded but rather to be strengthened. Germany furthermore claimed that certain secret documents which were discovered among the papers of the Belgian government at Brussels go to prove that Belgium had by its own acts relieved Germany of the obligation to respect her neutrality. These documents contain an account of certain conversations between the Chief of the Belgian General Staff and the British Mil-

tary Attaché at Brussels, relative to the sending of British military forces to Belgium in case of an invasion of the latter by Germany. The German authorities claim that this amounted to an Anglo-Belgian alliance against Germany. In answer to this charge King Albert (q.v.) of Belgium stated, according to an interview in the *New York World* (March 22, 1915), that the conversations referred to had been long known to the German authorities, having been communicated to the German Military Attaché at Brussels so as to avoid any semblance of entering into an unneutral agreement. Germany also complained that Belgian military preparations for the defense of her neutrality, instead of being impartially directed against the possibility of an attack from any of the Powers, were made entirely against Germany. To this it is answered that the fortress of Namur was directed against France as Liège was directed against Germany. Furthermore that if greater energy had been directed towards fortifying the German than the French frontier, this was but natural in view of the German activity in building military railways leading up to the Belgian frontier. Finally Germany declared that her invasion of Belgium was in response to violations of Belgian neutrality by France. But of this no satisfactory evidence has been produced. To the impartial observer, therefore, it would appear that German justification for the violation of Belgian neutrality must rest entirely on the ground of military necessity.

**Italy's Position.** At the outbreak of the European War, Italy found herself in a most trying position. To Austria and Germany she was bound by the defensive treaty of the Triple Alliance (q.v.). Her position as a member of this alliance had from the beginning been unnatural. Ever since Italy obtained national unity in 1870, there has been a strong movement to obtain the Italian-speaking provinces of Triest and Trentino, still held by Austria. This aspiration in Italy for what is called "Italia Irredenta," or unredeemed Italy, has been a source of constant friction between Italy and Austria.

The first indication of Italy's wavering in the support of her allies was when she threw her influence against Germany at the Algeiras Conference. Again in 1908 Italy was much irritated when Austria-Hungary annexed Bosnia-Herzegovina, thereby strengthening her position on the Adriatic Sea. But the most serious blow to the diplomatic group of the Triple Alliance was given by Italy in 1911 when she declared war on Turkey, a country which had come to be regarded as a member of the Triple Alliance group. Germany and Austria were forced to stand by and allow Italy to weaken the influence of the Triple Alliance by dismembering Turkey. All of these events indicated that Italy's attitude at the outbreak of a European war would be uncertain. Her position was made more precarious by her extensive coast line. Any war which involved Great Britain as an enemy would expose Italy to attack by the powerful British navy.

Apart, however, from questions of vital interest, Italy maintained that under the terms of the Triple Alliance she was not bound to come to the aid of Germany and Austria-Hungary, because, in her view, Austria-Hungary had been the aggressor and Italy's obligations under the treaty contemplated only a defensive war.

Accordingly on Aug. 1, 1914, Italy declared that she would remain neutral. Italy's declaration of neutrality did not, as the Italian Foreign Minister stated, "signify the relinquishment of Italian interests in the Balkans and in the Adriatic, but, on the contrary, the persuasion that such interests and aspirations shall be validly supported while the neutrality be maintained." (I.G.B. No. 2.)

Italy's next step was a most difficult one to determine. Should she remain neutral she could expect to gain little from either side, and she had to fear from her former allies, Germany and Austria, in case of their military success, a revengeful attitude. On the other hand to join the Entente allies was a difficult policy to pursue. In the first place it involved the moral question of turning against her former allies. In the second place the Russian and Serbian policy in the Balkans was not certain to be in agreement with Italy's ambition to control the Adriatic. Other considerations also caused Italy to hesitate before casting in her lot with the Entente allies. Such were the unfavorable financial condition of the country, the pro-German sympathies of the royal family, and the opposition of ex-Premier Giolitti (q.v.), who, with a strong personal following in the Italian Parliament, maintained that Italy should not enter the war.

For 10 months the contest between the neutralists and the interventionists went on in Italy. Great efforts were made by Germany and Austria, especially through Prince von Bülow and his Italian wife, to influence public opinion in Italy. It was clear, however, that there was a steady drift of popular sentiment in favor of the Entente. This movement was strengthened, too, by the death of the Marquis di San Giuliano (q.v.), Minister of Foreign Affairs, in October, 1914, who was popularly regarded as a strong sympathizer with Germany and Austria-Hungary. Baron Sidney Sonnino (q.v.), who succeeded him, is regarded as one of the most astute Italian statesmen since Cavour. In the meantime the Italian government had entered upon a series of communications with Austria-Hungary looking to a satisfaction of Italian aspirations and interests in the Balkans. The Italian Foreign Minister began by setting forth that, under Article VII of the Triple Alliance, Italy was entitled to compensations, in the event of any occupation of Serbian territory, even temporarily, by Austria-Hungary. The Austrian officials were not inclined to admit, at first, that Italy had any valid claim to compensations under the terms of the treaty of the alliances.

From this stand, however, Austria soon receded, probably under pressure from Germany, and conceded the principle that Italy was entitled to compensations. There followed several months of protracted negotiations. Italy demanded as the minimum that she would accept in the way of compensations "the district of the Trentino, a new district on the Isonzo, the special treatment of Trieste, the cession of some islands of the Curzolari Archipelago, a declaration of Austria's disinterestedness in Albania, and the recognition of our possession of Valona and Dodecanesia." To these demands Austria was willing to concede only a portion of the Trentino and was unwilling to make any cession before the end of the war.

These fruitless negotiations culminated in the declaration by Italy, on May 4, that she no

longer considered herself bound by the provisions of the Triple Alliance. After three weeks of hesitation during which public excitement in Italy reached a high pitch, Italy finally declared war on Austria, May 24, 1915. Just before the final break, according to a statement made by the German Chancellor, Austria-Hungary made a last attempt to purchase Italy's neutrality offering (1) the Italian part of the Tirol; (2) the western bank of the Isonzo "in so far as the population is purely Italian," and the town of Gradisca; (3) sovereignty over Avlona and a free hand in Albania; (4) special treatment of Italian nationals in Austria and amnesty for political prisoners who were natives in the ceded provinces; (5) Trieste to be made an Imperial free city, and to have an Italian University. Furthermore, it was stated that Austria would make these concessions at once and not wait for the conclusion of the war.

**Japan's Position.** Japan's entrance into the European War was due to her treaty of alliance with Great Britain. After the Chinese-Japanese War Japan was deprived of the fruits of her victory, when Port Arthur and the Liaotung peninsula had to be returned to China at the demand of Russia, France, and Germany. Smarting under this humiliation, Japan turned to Great Britain and in 1902 negotiated a treaty of alliance, according to the terms of which Japan agreed to come to the defense of Great Britain's Eastern possessions if she were attacked by more than one Power. Great Britain on the other hand insured Japan against a European coalition such as had intervened at the conclusion of the Chinese-Japanese War.

At the outbreak of the European War Japan saw her opportunity to revenge her humiliation at the close of the Chinese War. Actuated also by a determination to carry out her obligations to Great Britain, the Japanese representative in Berlin presented an ultimatum on Aug. 19, 1914, "advising" Germany to withdraw all warships from Asiatic waters and turn over to Japan the territory of Kiaochow before Sept. 15, 1914, which territory Japan promised eventually to restore to China. This port and surrounding territory had been obtained by Germany from China in 1897 as a compensation for the murder of two German missionaries. The Germans had fortified the harbor strongly and had made it a fine naval base. As Germany refused to reply to the Japanese demand, Japan declared war on Aug. 23, 1914. The Japanese Foreign Minister defended this action on the ground that Japan was bound by treaty obligations to come to the aid of her ally, Great Britain, and that Germany's position at Kiaochow gravely threatened the maintenance of peace in the Far East and the independence and integrity of China which Japan had bound herself to maintain.

**Turkey.** Germanic influence had for a number of years prior to the outbreak of the war been predominant in Turkey. It was natural, therefore, that Turkish sympathies would be with the Teutonic allies. But Turkey hesitated, at first, to make common cause with Germany because of her exposed position and the fact that her recent experiences in the Balkan wars had left her exhausted. Events, however, rapidly forced Turkey to abandon her attitude of quasi-neutrality. Shortly after the outbreak of the war two German warships, the *Goeben* and the *Breslau*, in order to escape capture by the British and French fleets, sought refuge in the Darda-

nelles. The demand of England and France that these ships should either be forced to put to sea or be interned was answered by Turkey stating that she had purchased the ships from Germany. Turkey also refused to remove the German crews of the two vessels. The Triple Entente also resented the action of Turkey in closing the Dardanelles and in serving notice that the "capitulations," under the terms of which the national subjects of various Powers were given special privileges in Turkey, would be revoked on Oct. 1, 1914.

When on October 29 the former German warship, the *Breslau*, bombarded the Russian Black Sea port of Theodosia, Russia accepted this as a declaration of war and the following day the Russian Ambassador at Constantinople demanded his passports. This action of Russia was followed by France and England declaring war on Turkey, Nov. 5, 1914. Turkey's entrance into the war aroused the hope in Germany and some fear in Great Britain and France that a Holy War would be proclaimed by the Sultan which would arouse the Moslem populations in India, Egypt, and Morocco. The Sultan's efforts in this direction proved unavailing, and no serious uprising occurred among the Mohammedan subjects of Great Britain and France.

**The Balkan States.** The opening of the European War found the Balkan Peninsula in the political shape given to it by the Treaty of Bucharest, Aug. 10, 1913, which closed the second Balkan War (q.v.). This treaty, which represented the latest effort on the part of the European Powers to adjust the Balkan situation, proved unsatisfactory to nearly all of the parties concerned. Turkey did not accept with good grace the loss of nearly all of her European territory. Bulgaria was bitter towards her former allies, Greece, Serbia, and Montenegro, who she felt had treacherously combined to deprive her of her just rewards. Serbia resented the action of Austria, Italy, and Germany in depriving her of an outlet to the Adriatic. Montenegro was disappointed in being forced to surrender Scutari. Finally Albania, the new state created by the Powers to thwart Serbia's ambition to reach the Adriatic, was in a state of ill-disguised anarchy under the shadowy control of Prince William of Wied. See WILLIAM OF WIED.

As has been seen, Serbia had been involved in the war from the beginning and Montenegro soon threw in her lot with her neighbor. The attitude of the other Balkan states was a matter of great concern to the diplomats of the allied groups. During the months succeeding the outbreak of the war, a diplomatic struggle ensued in these states, with the aim of winning their support to one or the other side.

In this struggle the diplomats of the Teutonic Powers had certain distinct advantages. In the first place the monarchs (Constantine I, Ferdinand I, Charles I, q.v.) of the three states, Greece, Bulgaria, and Rumania, were related by blood and marriage with the Teutonic royal families. Moreover, as the British Prime Minister (H. H. Asquith, q.v.) indicated in a speech in the House of Commons, Germany had a distinct advantage in that she could conduct her negotiations with a singleness of purpose, as her interests and those of Austria-Hungary were identical. On the other hand, the Entente diplomats had to consider the interests, not always identical, of three and, later, four Powers. Finally the Entente allies were handicapped by

the fact that Russian ambitions in the Balkans conflicted with the national aspirations of the smaller Balkan states; that Italy's territorial ambitions in Albania ran counter to the legitimate aspirations of Serbia, and that Greece resented the attempt of Italy to gain a foothold on the coast of Asia Minor, which was racially and historically Greek.

In view of these conditions it is not surprising that the efforts of the Entente diplomats, even had they been conducted more skillfully than they appear to have been, should have failed.

**Bulgaria.**—The second Balkan War left, as has been noted, a heritage of bitterness and hatred among the former Balkan allies. The Bulgars, smarting under the humiliation of the Treaty of Bucharest, welcomed the opportunity to revenge themselves upon their former allies. Completely disillusioned by their experiences of the past few years, they put aside all feeling of generosity or gratitude and frankly adopted a programme of "real politik." To the diplomats of the Entente and the Teutonic allies the Bulgarian authorities made it clear that all question of sentiment, so far as Bulgaria was concerned, was to be disregarded and that they were prepared to sell out to the highest bidder. Great Britain and France brought pressure to bear on Rumania, Serbia, and Greece to satisfy, in part, the territorial demands of Bulgaria. The Teutonic Powers made counter proposals promising Bulgaria a large part of Serbian territory in case of the success of the Central Powers. For more than a year Bulgaria hesitated, apparently weighing the relative advantages of the rival proposals. In the meantime the Bulgarian army was mobilized, in order to be prepared when the final decision was reached. It became increasingly evident as the months passed that the attitude of King Ferdinand and the military leaders was favorable to the Teutonic allies. Matters were brought to a head when, on Oct. 3, 1915, Russia notified Bulgaria that if she did not, within 24 hours, break with the Teutonic Powers, the Russian Minister would withdraw from Sofia. A similar demand was made by France, while Great Britain stated that if Bulgaria precipitated hostilities in the Balkans she would break off relations with her. On Oct. 8, 1915, Bulgaria replied, rejecting these demands and throwing her support to the Teutonic Powers. In a manifesto issued by M. Radoslavoff,\* the Bulgarian Premier, there was set forth the reasons for Bulgaria's decision. He stated frankly that considerations of self-interest had dictated the step. He pointed out that Bulgaria's chief economic interests were with the Teutonic Powers and Turkey, and that these interests would be seriously menaced if Constantinople fell into the hands of Russia. In reviewing the proposals of concessions made to Bulgaria by the opposing groups, he held that the Teutonic proposals were more advantageous to Bulgaria. And finally he had reached the conclusion that the progress of the war indicated the probable success of the Central Powers, and it was vital to the interests of Bulgaria to be on the side of the victors.

**Greece.**—Conflicting influences and interests

\* Vassil Radoslavoff, born in Lowatseh; studied law at Heidelberg; at various times served as Minister of Justice, Minister of the Interior, and Premier; did much as Premier in 1913 to bring Balkan War to an end; became Premier and Minister of Foreign Affairs (October, 1915) during European War; made important declarations of Bulgarian policy; shot at twice (March, 1916).

complicated the situation in Greece at the outbreak of the war. On the one hand, the royal family was closely related to the Hohenzollerns, the Greek Queen Sophia being a sister of the German Emperor, William II (q.v.). On the other hand, the Premier Venizelos (q.v.) felt that the best interests of Greece would be served by joining the Entente allies. Popular sympathy in the country appeared to be with the Entente group, and especially with France. In addition, Greece was bound by a treaty of alliance with Serbia which obligated her to come to the aid of Serbia if she were attacked by Bulgaria. During the first months of the war the diplomats of France and Great Britain directed their efforts to winning all of the Balkan states to the support of the Entente. With this end in view both Greece and Serbia were urged to make territorial concessions to Bulgaria. These efforts were seconded by M. Venizelos, but the Greek King flatly opposed any territorial concessions and maintained that the best interests of Greece would be served by the observance of strict neutrality. The break between the King and his chief Minister led to the resignation of the latter in March, 1915. His return to office shortly after as a result of popular approval expressed in the elections to the new Chamber was hailed as a victory for the Entente, and it was generally expected that Greece would soon enter the war. The situation became acute when, in September, 1915, Bulgaria mobilized her army and Greece did likewise. Bulgaria's entrance into the war on the side of the Teutonic Powers raised the question of Greece's obligation under the treaty of alliance with Serbia. M. Venizelos maintained that Greece was bound to come to Serbia's aid, but the King once more interposed his objections, holding that the treaty contemplated only a local Balkan war and not one in which the Great Powers were involved. Again M. Venizelos resigned. In the meantime arrangements had been made by the Greek Premier with the Entente allies for the landing of French and English troops at the Greek port of Saloniki, which troops were to be used to aid Serbia. This use of a Greek port was a clear violation of Greek neutrality and the Greek government entered a formal protest. It was understood on all sides that this protest was purely formal, and the landing of troops continued. The resignation of M. Venizelos aroused some apprehension in France and England and pressure was brought to bear upon the new Premier, M. Zaimis (q.v.), to define his position. He stated that the attitude of Greece would be "neutrality, with the character of sincerest benevolence towards the Entente Powers." King Constantine, however, vigorously protested against the violation of Greek territory by Great Britain and France. He maintained that it was the sheerest hypocrisy for these countries to protest against the violation of Belgian neutrality by the Germans, while they themselves were violating Greek neutrality. He was strongly supported in these views by Stephanos Skouloudis, who succeeded Zaimis as Premier and who also took the portfolio of Foreign Affairs.

The period of the premiership of Skouloudis was very stormy. The Allies seemed to fear that their Saloniki expedition was threatened from the rear by the Greek army. This fear of an attack compelled General Sarrail to keep a strong force on the Macedonian front. In order to remove this threat the Allies from time to time

made demands on the Greek government which weakened the latter's military position. The Allies desired the use of the Peloponnesian railway to transport the regenerated Serbian army from Corfu to Saloniki. This was refused on the ground that it would be a violation of neutrality. After some hesitation the British Foreign Office announced that the troops would be transported by water.

This demand was only a preliminary to those which were to follow. In June, 1916, the Bulgarians crossed the Macedonian frontier and seized several Greek forts. When war was not immediately declared on Bulgaria, the Allied Powers demanded that the Greek army be demobilized. To enforce their demands, they blockaded the Greek ports and seized vessels and supplies in the harbors. Martial law was declared in Saloniki and the Greek military commander was superseded by a Frenchman. The Greek government sent identical notes of protest against interference with her trade by the Entente Powers to the United States and to all the South American governments. Nevertheless the result of the blockade was the demobilization of the 12 senior classes on June 9th.

As soon as order was restored a new set of demands was made on the Greek government. Before they were officially received, however, the Skouloudis government resigned. Former Premier Alexander Zaimis was again called upon to head the cabinet. The first act of his government was to accept unconditionally the demands of the Allies, which included briefly, (1) demobilization of the rest of the Greek army, (2) replacing of the Skouloudis cabinet with a business cabinet favorable to the Allies, (3) dissolution of the chamber and the holding of new elections, and, (4) replacement of certain police functionaries who had permitted insults against the Allied legations. Upon the acceptance of these demands the Allied blockade was withdrawn.

During this period of national unrest there was gradually springing up a strong anti-German party. The seizure of the garrison at Kavala by the Bulgarians, the abandonment of the Macedonian forts without a struggle and the entrance of Rumania into the war, brought the move to a head. A Committee of National Defense was established by those who were opposed to the supine attitude of the Greek government. It set up a provisional form of government for Macedonia and demanded that the Bulgarians be driven out. In order to aid this movement to succeed the Allies took an active part in it. They seized enemy merchantmen in the Piræus, the port of Athens. They also demanded and received all Greek ports and the use of the telegraph system. On account of inability to handle the situation the Zaimis ministry resigned.

The pro-Ally movement reached its height when a formidable revolution broke out in Crete during the third week in September. Venizelos immediately left Athens with a number of supporters for the seat of the revolution. One of his chief followers was Admiral Coudouriotis, whose desertion of the King left the latter in a very serious predicament. A proclamation establishing a provisional government was issued by Venizelos and Admiral Coudouriotis, and within a very short time Macedonia and all of the Greek islands were under their control. The provisional government declared war on Germany and Bulgaria on Nov. 25, 1916.

The Allies heartily approved the new Veni-

zelos government and proceeded to make further demands on the new Greek government, headed by Spyridon Lambros. The new demands included the turning over to the Allies of the Greek navy, certain strategical railways, forts, mails, telegraphs, police service, naval material, and the Piræus. They further demanded that any Greek who so desired be permitted to join the new government. All these demands were ultimately acceded to as a result of necessity.

Apparently still fearing an attack in their rear, the Allies demanded that all the arms and munitions belonging to the Greek army and navy be turned over to them. The Greek government was given until Dec. 1, 1916, to grant this last request. King Constantine refused to agree, marines were landed from the Allied fleet, and a scene similar to the days of the French Revolution occurred in Athens. True to his promise, Vice Admiral du Fournet fired upon royalist troops, when the time of his ultimatum expired. Thereupon a regular civil war broke out in Athens. Royalist troops fired upon Venizelists and vice versa. As a result of a truce King Constantine agreed to surrender all the mountain guns of the Greek army. When this was accomplished all the Allied marines were withdrawn to the fleet with the exception of a small guard.

The Entente nations continued to exert a political and economic pressure upon the Greek government. King Constantine adopted a passive attitude of submission to the demands of the Allies and determined to rely on the ultimate recognition by the world that his treatment had been unjust. The long conflict between King Constantine and the Entente came to an end on June 12, 1917, when the King abdicated in favor of his second son Alexander. This step was taken at the dictation of the Allies, who decided, after investigation, that the King and his elder son George were strongly pro-German. Zaimis, the prime minister, resigned and was succeeded by Venizelos, the staunch friend of the Entente. One of the first acts of the new ministry was to declare war on Bulgaria and Germany (July 2). Allied control was withdrawn with the exception of that over telegraphs and press censorship. Immediate steps were taken to actively join the Entente army around Saloniki. This removed the continual threat of an attack by Greek forces in the rear of General Sarrail's army. See *South-eastern Theatre*.

*Rumania.*—Somewhat the same division of sentiment obtained in Rumania as in Greece at the outbreak of the European War. The King, Charles I, was a member of the Hohenzollern family, and it was rumored that there was a secret treaty between Rumania, Germany, and Austria-Hungary. The mass of the Rumanian population is composed of illiterate peasants, but among the educated classes there was a strong pro-French and especially pro-Italian sentiment. The Rumanians claim descent from Roman colonists; and there has always been a strong sentimental attachment to Italy among the Rumanians. Apart from conflicting sentimental influences, the question of the wisest policy for Rumania to pursue to advance her material interests was not easy to determine. On the one hand a large Rumanian population was included in the Austrian dominions in Transylvania, while on the other hand the Russian province of Bessarabia was equally Rumanian

in nationality and more valuable economically than Transylvania.

At the head of the Rumanian ministry was John Bratianu, one of the shrewdest statesmen in the Balkans. He advocated a policy of waiting, with the intention of entering the war at the proper time when the greatest reward could be obtained by the least fighting. The death of King Charles in October, 1914, and the entrance of Italy into the war, were expected to influence Rumania to join forces with the Entente allies. But the failure of the Russian campaign in Galicia and Bulgaria's alliance with the Teutonic Powers caused Rumania to continue her policy of watchful waiting.

She continued this policy until April 28, 1916, when the Rumanian minister at Vienna presented a note to the Austro-Hungarian Foreign Minister which said that Rumania considered herself at war with Austria-Hungary since nine o'clock the previous evening. She maintained that her treaties with the Central Powers had been continually broken since the war began and that Rumanians in Austria-Hungary were being persecuted. She intervened to prevent these persecutions, to shorten the war if possible, and to realize her national ideal. She thought an alliance with the Entente allies would best enable her to accomplish the last purpose.

*Portugal.* Portugal was bound by a treaty of alliance with Great Britain, and at the outbreak of the European War Portugal stated that she was prepared to carry out her treaty obligations whenever Great Britain desired her to do so. However, Portugal did not enter the war until more than a year after the beginning of hostilities, although there were clashes between Portuguese and German troops in Africa. On Feb. 24, 1916, at the request of Great Britain, Portugal seized a number of German and Austrian ships lying in Portuguese harbors. On March 8, 1916, Germany declared war on Portugal, stating that the seizure of German vessels was done at the dictation of Great Britain, and could be regarded in no other light than as a hostile move against Germany.

For purposes of convenience the following dates of the declarations of war are given.

Austria against Serbia	July 28, 1914
Germany against Russia	Aug. 1, 1914
Germany against France	Aug. 3, 1914
Great Britain against Germany	Aug. 4, 1914
Austria against Russia	Aug. 6, 1914
Montenegro against Austria	Aug. 8, 1914
Serbia against Germany	Aug. 9, 1914
France against Austria	Aug. 10, 1914
Great Britain against Austria	Aug. 12, 1914
Montenegro against Germany	Aug. 12, 1914
Japan against Germany	Aug. 23, 1914
Austria against Japan	Aug. 25, 1914
Austria against Belgium	Aug. 28, 1914
Russia against Turkey	Oct. 30, 1914
Great Britain against Turkey	Nov. 5, 1914
France against Turkey	Nov. 5, 1914
Italy against Austria	May 24, 1915
Italy against Turkey	Aug. 22, 1915
Great Britain against Bulgaria	Oct. 15, 1915
Serbia against Bulgaria	Oct. 16, 1915
France against Bulgaria	Oct. 16, 1915
Italy against Bulgaria	Oct. 19, 1915
Russia against Bulgaria	Oct. 19, 1915
Germany against Portugal	Mar. 8, 1916
Rumania against Austria-Hungary	April 28, 1916
Italy against Germany	Aug. 28, 1916
Turkey against Roumania	Aug. 29, 1916
United States against Germany	April 6, 1917
Cuba and Panama against Germany	April 7, 1917
Greece against Bulgaria and Germany	July 2, 1917
Siam against Central Powers	July 21, 1917
Liberia against Germany	Aug. 4, 1917
China against Central Powers	Aug. 14, 1917
Brasil against Germany	Oct. 26, 1917
United States against Austria-Hungary	Dec. 7, 1917

## III. MILITARY OPERATIONS

The military operations of the great war, in which the Central Powers were by turns on the offensive and on the defensive, hinge on the plan of the German general staff according to which Austria, with a small German force, was to hold Russia in check, while Germany crushed France, both Central Powers uniting for the subsequent Russian campaign.

The strategy of the war from this viewpoint falls easily under the following main divisions: I, Introduction and discussion of mobilization; II, Western theatre, or campaign against France; III, Eastern theatre, or campaigns against Russia; IV, Southern theatre, or campaigns against Serbia (involving Bulgaria's entry into the war) and Italian campaign; V, Southeastern theatre, or Turkish campaigns, including Suez, Gallipoli, and Caucasus. In no theatre of the war was the strategy unconnected with events taking place or about to take place on other fronts.

I. Introduction. The war that broke out in 1914 involved three continents and the seven seas. Not only its combatants, but the killed and wounded, were to be numbered by millions. Every known resource of mechanical ingenuity was drawn upon, and old and forgotten methods of warfare were brought into play side by side with the most powerful modern artillery, while aeronautics for the first time had occasion to show its worth. (See section *Aerial Operations*.) The edifice of international law, of the conventions of warfare, so painfully built up after centuries of struggle, was toppled over as a thing of no account. With these considerations before us we must remark that in the space here available nothing but a statement of the principal facts can be attempted. But even so, the nature of the struggle on one front, the western, calls for a word or two. When both sides simultaneously reached the sea there began a siege over the whole front that gave the struggle in this theatre a character unique in military history. At certain places in the "line" 32 parallel lines of German trenches were discovered by reconnaissance. The trench systems of this front were estimated, after including communication trenches, to be 25,000 miles long. Frontal attack became a necessity, since flanks there were none, and yet these attacks all proved failures (Feb. 1, 1917), for the experience gained under the new conditions had not as yet led to such a disposition of forces and resources as to carry them through to a decision. The most desperate efforts were made, first by one and then by the other side, to raise the siege, so to say, by a concentration at some selected point, and thus break through and end a situation that only a few years ago would have been deemed intolerable.

On the other fronts the phenomena of what may well now be called old-fashioned warfare were more or less reproduced, but even in their case a marked tendency to approximate to the conditions in France manifested itself—indeed may be said to have established itself on a part of the Russian lines and to a certain extent on the Italian. A marked feature of this war was the so-called mobilization of industries. So great was the draft made on the industrial resources of the countries involved that the struggle, other conditions equal, may be said to have resolved itself into a competition by each side to outstrip the other in supplies and munitions.

**Mobilization and Concentration.** When it became evident that the general European situation was becoming more and more serious, covering troops (*troupes de couverture*) were sent by the French government to the eastern frontier. These troops, five corps in all, or 200,000 men, with cavalry, began their movement on July 31 at 9 P.M., and had completed it on August 3 at noon. They were not to cross a zone 8 kilometers wide along the frontier, in order to prevent any clash with the Germans, so long as war was undeclared. On the German side the Emperor, on July 31, decreed the *Kriegsgefahrzustand*, or a sort of state of martial law, under which certain military measures could be adopted on the frontier, and the telegraph and railway services taken over by the military authorities.

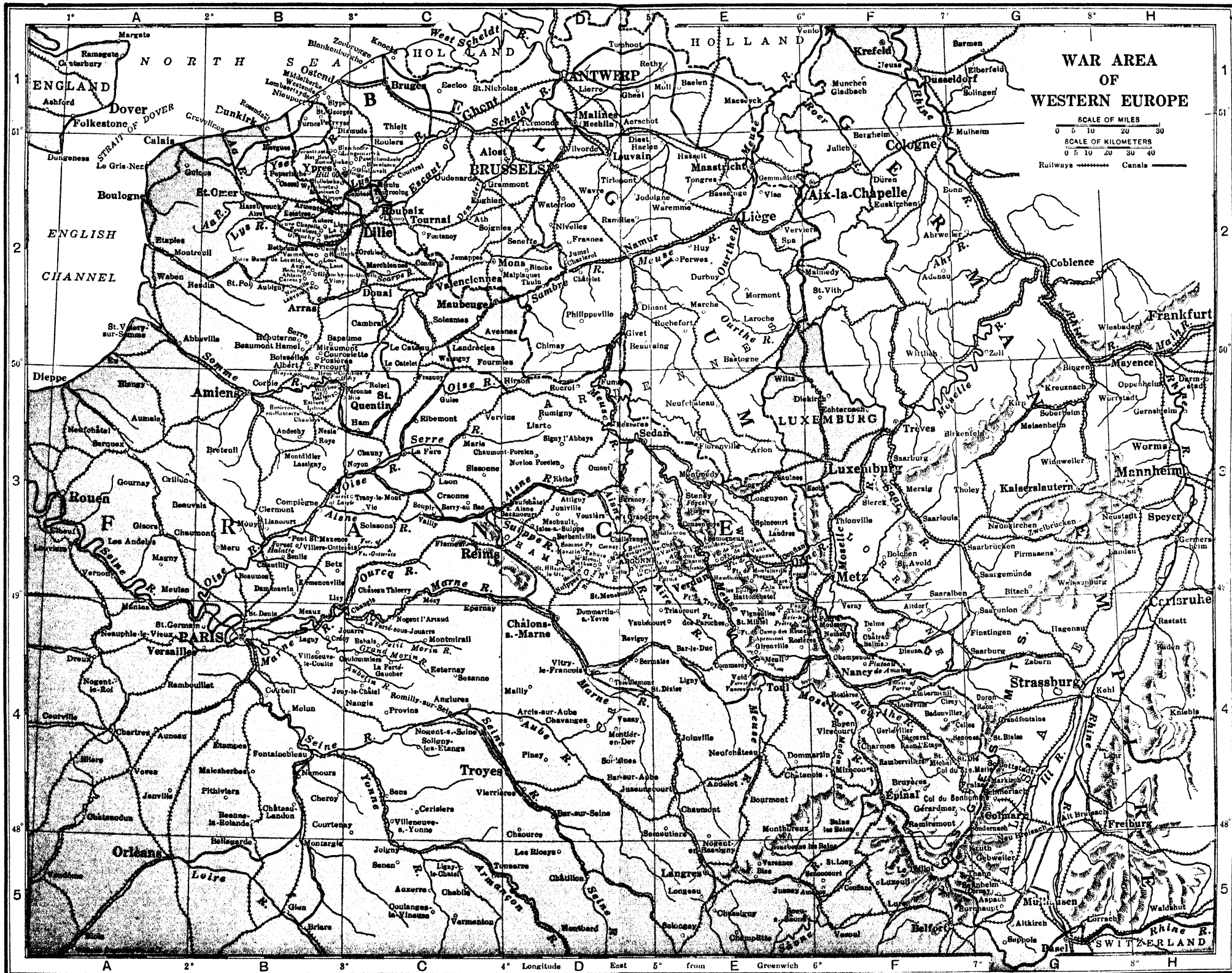
Mobilization proper, however, began in both Germany and in France on August 2, in France at midnight. It was asserted that in Germany the operation was set afoot well before the formal date given above. In both countries it was carried on with the precision that the whole world had learned to expect of Germany, but of which, as regards France, it was somewhat doubtful. The purpose of mobilization, it may be recalled here, is to pass from peace to war footing. (See *MOBILIZATION*.) Each man liable to service reports on a given date at a specified point, draws his arms, uniform, and equipment, and joins a designated organization. Companies, battalions, regiments, etc., are thus brought up to war strength; transport material is requisitioned and train service prepared. The French mobilization, in two periods of ten and six days respectively, closed on August 18; the German, according to the French, on the 16th. German authorities, however, give the closing date as the 20th. Mobilization was followed by concentration.

The French armies began their concentration in the east of France from Belfort to the Belgian frontier, thus respecting the neutrality of Belgium and of Luxembourg. By this course the French, incidentally, gave the Germans choice of ground and freedom of manoeuvre. It should be recollected, however, that the exact intentions of the German general staff were unknown; they might attack either on the right or the left bank of the Meuse, or attempt a demonstration by the Oise, or even risk a break from Nancy on to Verdun. Further, the possibility of the offensive had to be kept in view, and the offensive, for the French, was possible only in Alsace and Lorraine. In other words, the concentration of the French was both offensive and defensive; while guarding the approaches on the east, they would be ready to face in any direction. As a matter of fact, the plan of concentration could not be fully carried out; it had to be modified because of the German advance through Belgium. Hence, in general terms, the French armies were stretched out from Belfort north and then northwest towards the Sambre, to join hands, if possible, with the English and Belgians. Certain corps even pushed their way into Belgium itself.

The German problem of concentration was simpler, if, as there is reason to believe, their intention from the first was to smash their way through Belgium. They contented themselves with merely observing the strong eastern (French) frontier, and disposed their other armies northward through Trèves, etc., to Aix-la-Chapelle, in position to inaugurate and carry through a vast sweeping movement through Bel-







WAR AREA  
OF  
WESTERN EUROPE

SCALE OF MILES  
0 5 10 20 30  
SCALE OF KILOMETERS  
0 5 10 20 30 40  
Railways ----- Canals -----

1° 2° 3° 4° 5° 6° 7° 8° Longitude East from Greenwich





gium. They crossed the frontier of this country without waiting for either mobilization or concentration, using for this purpose troops kept immediately available near the frontier.

On the periods of mobilization and concentration of the other combatants it is not necessary to dwell. In Austria-Hungary the operation was merely a repetition of the German process, and, like that, carried out with promptness and accuracy. Russia was expected to be slow, but on the contrary was so energetic as to suggest a belief that she began before the formal declaration of war. England had no army to mobilize, but she prepared her "expeditionary force," crossed it over to the Continent, and got into position opposite the German right in time to offer a resistance that was invaluable to the Allied cause. See UNITED KINGDOM, *History*.

**II. Western Theatre.** The German armies, by a surprise thrust through Belgium in August, 1914, sought to paralyze the French army. This operation failed at the Marne (September).

Trench warfare resulted in the West, and from the North Sea to the Swiss border the line remained substantially unchanged to July, 1916, the battle of Verdun and the joint Allied offensive (July, 1916) forming the high-water marks of this fighting.

The detailed account of military operations on this front has six main steps: (1) The fortunes of the Belgian army up to its escape from Antwerp and safe retreat to the Yser Canal; (2) The relative dispositions of the rival armies of the French and German high commands up to and including the battle of the Marne; (3) The race to the seacoast which resulted in the establishment of the intrenched lines from Dixmude to Belfort; (4) The attempts of either side to break the intrenched line, including the battles of Ypres, Lille, Lens, and the Champagne drive inaugurated by Joffre to aid the hardly pressed Russians; (5) The battle for Verdun, in which the Germans sought a decision hoping not so much to shatter the French line as to shatter the morale of the French people and make a breach in Allied solidarity; (6) The Allied offensive in Picardy, in conjunction with the Russian and Italian activities in the East and South. It seems clear that Germany's plan of action was first to crush France and then to fall upon Russia. What was the shortest road to France? The frontier was heavily fortified; but even otherwise it would have left too narrow a front for the overwhelming armies which Germany intended to set in the field. Hence the shortest road lay through Luxemburg and Belgium. Of natural obstacles there were none; the three fortresses, Liège, Namur, and Maubeuge, were not in supporting relation to one another, the Belgian frontier was only 120 miles from Paris, and the way lay through the easy valleys of the Oise and of the Meuse.

Accordingly the Germans, violating the neutrality of Luxemburg and Belgium, undertook a vast sweeping movement, with its pivot at Mont Donon and its marching flank flung beyond the Sambre and the Oise. The French, on the other hand, respecting the neutrality of the countries just mentioned, had planned to attack the Franco-German frontier directly, under the following distribution of armies: first army (Dubail)\* from the Swiss frontier to Donon; second

(de Castelnau)† from Donon towards Metz; third (Ruffey) in the Woëvre, facing the Metz-Thionville frontier region; fourth and fifth (Langle de Cary and Lanrezac) on the Belgian frontier.

Germany placed in line the following armies: first (Von Kluck) the marching flank; second (Von Bülow); third (Von Hausen); fourth (Duke of Württemberg); fifth (Crown Prince of Prussia); sixth (Rupprecht, Crown Prince of Bavaria); seventh (Von Heeringen); eighth (Von Deimling), to remain on the defensive in Alsace. What may be counted as a ninth army, under Von Emmich, made up of elements in immediate readiness, was to act as advance guard to the right wing, and carry Liège, on the expiration of the ultimatum addressed to the Belgian government.

As has been implied, Belgium declined to agree to the demand made by Germany to allow German troops to cross Belgian territory to the French frontier. August 3 and 4, all doubt as to German intentions having been removed, the Belgian authorities ordered bridges destroyed on all probable lines of advance, and the Belgian forces to move forward as follows: the first division from Ghent to Tirlemont; the second, Antwerp to Louvain; the fifth, Mons to Perwez; the sixth, Brussels to Wavre. The fourth was to remain at Namur, and the third in its position, Hasselt-Liège-Verviers. These movements were covered by the cavalry division (Waremmé), by a mixed brigade at Tongres, and by another at Huy. The strength of this army was about 117,000 men, increased later by 18,500 volunteers, with the King in command. It was, if opposed by superior numbers, to hold good defensive positions barring the enemy's advance, and to await in these positions the arrival of troops from the British and French armies. But if this junction were impossible, then the Belgian army was not to run the risk of severe loss, but was to guard against being enveloped, and act so as to secure its communications, for the purpose ultimately of joining hands with the Allies. Opposed by equal numbers, it was to attack, if conditions were favorable. In any case, Liège, Namur, and Antwerp were to be defended.

*Invasion of Belgium.*—On August 4 two cavalry divisions crossed the frontier, advanced

later attended the Ecole de Guerre; general of brigade (1904); at Saint-Cyr was adjunct professor of geography (1874-76) and of military art and history (1880-85) and then commandant; wrote on his specialties; Commander of the Legion of Honor and possessor of various decorations; Military Governor of Paris during European War.

† Edouard de Curières de Castelnau, born in 1851; served in Franco-Prussian War; colonel attached to general staff (1896); served in Cochinchina and Algeria; commander of "Iron Division" at Nancy (1899); early in European War commanded Second Army of Lorraine and came to be known as the "savior of Nancy"; after battle of the Marne took command of the Army of the Somme; chief of the general staff (December, 1915); went to Greece and helped plan defenses of Saloniki.

‡ Albrecht, Duke of Württemberg, born (1865) in Vienna, son of Duke Philip of Württemberg and heir presumptive to the throne of the Kingdom; married (1893) the Archduchess Margareta Sophia of Austria; held commands in regiments of Uhlanes, Grenadiers, Dragoons, cavalry, and infantry, rising to be general in command of the Thirteenth Army Corps; in command of German forces in Belgium (October, 1914) after its invasion and temporarily took over command of Crown Prince's army (February, 1916), received Order Pour le Mérite from the Kaiser.

§ Rupprecht, Crown Prince of Bavaria, born (1869) in Munich, eldest son of Ludwig (Louis) III, who became King in 1913; married the Duchess Marie Gabriele of Bavaria (1900); had a university education and military training in the Kriegsakademie; traveled extensively in India, Japan, China, etc. (1902-05); general, commanding the First Army Corps (1906); led Bavarian army in European War and received from the Kaiser the Order Pour le Mérite.

\* Augustin Yvon Edmond Dubail, born (1851) at Belfort; educated at Saint-Cyr, served in Franco-Prussian War, and

upon Visé, and there found the bridge destroyed. Behind the cavalry forces came an army composed of the seventh, eighth, ninth, and eleventh corps. At the same time two other corps were concentrated at and near St. Vith—thus making a force of about 300,000 men on the roads leading into Belgium and converging on Liège. On the 5th a demand was made on the governor of the fortress of Liège, General Léman, to allow an unopposed passage to the German army. This demand refused, the forts east and northeast of the town were attacked, but the Germans were repulsed. On the night of August 5 and 6 an attempt was made to break the Belgian line between the Meuse and the Ourthe, and succeeded in forcing the troops between the intervals of the forts to fall back. The mobile troops of the defense were now withdrawn to join the main army, leaving their garrisons in the forts. On the 12th large calibre fire was opened on the forts of the right bank, and by the 17th the last one had fallen to the Germans. During this time the main Belgian army had taken up a position on the Gette. On the 12th this stream was forced at Hælen, but an attempt to pass on was repulsed. Fresh troops came up and threatened to turn the Belgian left; on the south they occupied Tirlémont; on the 18th the Belgian position was critical. Hence but one course was open to the Belgians: they retired on the 18th at dusk to take a position on the left bank of the Dyle. But the Germans advanced so rapidly that the Belgians could not safely stop, and were forced instead to continue their way to Antwerp, which they reached on the 20th. The Germans entered Louvain on the 10th, Brussels on the 20th, and crossed the French frontier on the 24th.

Namur was taken under fire on the 20th and 21st of August; on the 25th the last fort, Suarlée, fell. Here, as at Liège, heavy calibres were used. The commander of the 4th (Belgian) division withdrew his forces on the night of the 23d and 24th of August, and succeeded 10 days later in entering Antwerp.

A new part now fell to the Belgian army. August 20 it had taken up a position resting on the forts of Antwerp with a detachment at Termonde. Its business now was to detain as large a force as possible, to take the offensive whenever an important engagement took place elsewhere, and to attack in the neighborhood of Antwerp whenever there was any chance of success. Accordingly a sortie was made August 25 and 26; on September 4 a German force that had driven its garrison out of Termonde crossed the Scheldt, but on the appearance of Belgian forces on the left bank crossed back, leaving Termonde once more in Belgian hands. After this date all hostile efforts to cross the river were checked and the line of retreat to the west kept open. Other operations took place, as on September 9, when the Belgians got as far as Louvain and forced the recall of a division from France to Antwerp. One effect of these operations was to delay for two days the march southward of a German corps, at the time when the retreat from the Marne had begun.

The fall of Antwerp was however only a question of time; the siege began on September 28, and in a very short time it became clear that the place could no more resist the German artillery than had Liège and Namur. A delicate question then presented itself: to hold Antwerp as long as possible without compromising the retreat.

Day by day the Germans continued their work of demolishing the detached forts of the place and drew closer and closer. On October 5 Lierre was occupied and the river crossed below the town. On the 3d and 6th of October they tried without success to cross the Scheldt. Furthermore, in France, the German right was steadily approaching the sea; if they could reach it before the Belgians had made good their retreat these latter might be entirely cut off. The better to secure this retreat Ghent was occupied on the 9th by the French and British (7th division). The retreat however began on the evening of the 6th, and by the morning of the next day the entire Belgian army was across the river. The Germans had indeed crossed the Scheldt themselves, on the 6th at Schoonarde, but were unable to interrupt the retreat. On October 10 Antwerp capitulated, and on the 15th the Belgian army took its stand on the Yser, 82,000 strong. The subsequent fortunes of this army are bound up with those of the Franco-British forces on this front.

*Invasion of France.*—When it became evident that France was to be invaded from Belgium, the 3d (French) army moved up (August 10) to Longwy, with the 4th army taking a position further west, and the 5th stationing itself between the Sambre and the Meuse. General French (August 23) stood between the Sambre and the Scheldt, on the line Condé-Binche, with so much of the British expeditionary force, two corps and a cavalry division, as had crossed to the Continent. The German armies that had concentrated on the line Aix-la-Chapelle-Malmédy-Trèves-Metz-Strassburg now moved out, Von Kluck through Belgium, Von Bülow to the Sambre (Namur-Charleroi); Von Hausen and the Duke of Württemberg across the Ardennes on Dinant and Neufchâteau. The Crown Prince crossed Luxemburg. The Crown Prince of Bavaria marched against de Castelnau and in this region the general action opened on August 20, with the driving back of de Castelnau (invasion of Lorraine), who, however, brought up firm before Nancy, September 7. As early as August 15 some French troops had crossed the Belgian frontier and had engaged the Germans in minor affairs (e.g., Dinant). On the 22d Charleroi was taken by the Germans, who on the 23d attacked the French at this place and the British at Mons. As the 3d and 4th (French) armies were compelled to withdraw before an attack coming from Belgian Luxemburg, the right flank of the fifth army extending almost up to Namur was exposed, and that army withdrew. This in turn compelled the withdrawal of the English from Mons, and so the whole Allied army now retreated, vigorously pursued by the Germans, on the line Paris-Verdun. In spite of one or two checks suffered in the advance, as at Guise, it may be said that on the whole this movement was up to a certain point irresistible. That point was reached when the Allies turned on crossing the river Marne, and not only defeated the Germans, but forced them to retreat to the Aisne. The French generalissimo, Joffre, had constantly kept before him the plan of so turning in the retreat from the Belgian frontier, and had selected the line Paris-Marne-Verdun as the proper place, and Sept. 6, 1914, as the proper date.

On Aug. 20, 1914, General Joffre assumed command of the Allied armies in France. He had before him the infinitely grave problem of

developing suitable powers of resistance, mostly out of beaten and retreating armies, and of selecting the time, place, and manner of applying these powers, which he did at the Marne (to be described later). After that battle the Allied armies under his command successfully held off the Germans, thus upsetting their plans of crushing France before proceeding to conquests elsewhere.

*The Approach to Paris.*—During the retreat two new armies had been formed: one under General Foch\* (the ninth), which took position between d'Esperey's (formerly Lanrezac's) and Langle de Cary's; and another (the sixth) under Manoury from Paris. This last army was to rest on the intrenched camp of the capital, face east on the right bank of the Ourcq, and attack Von Kluck's right. It is a sound principle of warfare that victory may be obtained only by beating the hostile army. When therefore the Allied armies passed into the Paris-Verdun gap, Von Kluck, sweeping down on Paris from the north, properly turned south-eastward after the enemy. But he had not reckoned upon the formation of the sixth army sent out from Paris, in motor vehicles of every description to take its place on the battle front. Before, however, taking up the Battle of the Marne, we must very briefly describe what had in the meantime been taking place in eastern France; the pressure in this quarter, indeed, culminated in conflicts contemporaneous with and forming a part of the great battle of September 6. Before the sudden swerve of Von Kluck from Paris on September 4, it seemed as if the prediction that the Germans would be in Paris six weeks from the outbreak of war was about to be fulfilled. General Gallieni had begun to prepare the city for a siege. The noise of the battle could be heard by the Parisians.

*Events before the Marne.*—After the declaration of war the French invaded both Alsace and Lorraine. These invasions came to grief. The French twice occupied Mülhausen; the first time they were driven out, the second they retired of their own accord. They had also reached Saarburg and Saarbrücken. These invasions undoubtedly had a political end in view, conditioned of course by the possibility of military success. Incidentally, the Alsace operations were to contain troops that otherwise might have been used to resist the invasion of Lorraine. This invasion opened well enough: the French occupied Dieuze, Morhange, Château-Salins, across the frontier. But it came to naught at Morhange, in which the French, completely beaten, were driven back across the frontier, and were forced to settle down to the real business of protecting their eastern frontier. The Germans, early in August, occupied Cirey, Badonviller, and Baccarat. Farther north the army of Metz got to within 15 miles of Verdun. Still farther north the army of the Crown Prince, which had on August 22 crossed the frontier near Longwy (occupied the 27th), drove back the French, and finally took up a position between Bar-le-Duc and the Ardennes, facing eastward, and opposed by Gen-

eral Sarraill's army. To the west of the Crown Prince the Duke of Württemberg, who had crossed the Meuse near Mézières, formed up, facing south between the Crown Prince's army and Epernay. The first French army (Dubail) in front of Epinal faced the east; on its left General de Castelnau continued the line east and north of Nancy, along the Meuse, until it rested on the defenses of Verdun. The garrison of Verdun carried it on east, north, and west of the position until it joined with Sarraill's army.

With the armies in these positions Nancy was attacked; its main natural defense in the chain of hills known as the Grand Couronne de Nancy. The Germans occupied various towns in the east, e.g., St. Dié, but not without some heavy fighting in the Vosges. On the north they pushed the French back to the Grand Couronne, but never got beyond it. The main army marched from Château-Salins and engaged the French in a series of stiff fights around the Forest of Champenoux. At the same time a part of the army of Metz, with its left resting on Pont-a-Mousson, joined in the attack. Six miles north-east of the city, on the plateau of Amance, de Castelnau had assembled his artillery. Before the troops from the north could coöperate with those from the east in attacking this position, Ste. Geneviève, 10 miles or so northwest of Amance, had to be occupied. Here Foch (August 22), with a modest force, defeated the Germans with fearful slaughter. The attack on Nancy from the east through Amance was equally unsuccessful. After much fighting along the entire position the bombardment of Amance began on August 30, 31 and lasted for more than a week. The contest over the entire line increased in intensity; indeed, from the German point of view, it could do no less, for now (September 7-8) their armies were being pushed back from the Marne, and it was vital to their success that they should break through. The Emperor himself was present at the great assaults, six in number, made on Amance, and all driven back with loss. Checked before Nancy, the Germans on September 10 evacuated Pont-a-Mousson, and on the 12th, Lunéville, St. Dié, and some smaller places. They now concentrated their efforts between Toul and Verdun, with the purpose of surrounding the latter place. To this end they bombarded Fort de Troyon on the Meuse south of Verdun and several times attempted to take it by assault. But the fort made an extremely gallant defense, and although almost reduced to extremities, managed to hold out. The final assault was delivered on the 13th of September. On the 20th a fresh advance was made on the fortresses from the east to cross the Meuse south of Verdun. The garrisons of Verdun and Toul respectively pushed out attacks on the German flanks, while the Germans themselves advanced in the centre and captured the point of St. Mihiel on the Meuse (September 25).

*Grip on St. Mihiel.*—The Germans crossed the river on the 26th and began to march northward towards the Aire valley. A situation was then developed that might have proved of the utmost consequence to the French. To meet it, Sarraill came down from the north, and the twentieth corps was hurried up from near Champenoux. At 5 p.m. of the 26th the advanced guard of the corps, which had crossed at Lironville, got contact with the enemy. After some extremely heavy fighting the Germans fell back to the Meuse and intrenched at

\* Ferdinand Foch, born (1851) at Tarbes, Hautes Pyrénées, of a Basque family; served in the Franco-Prussian War as a subaltern; artillery captain at 26; professor of tactics in the Ecole de Guerre for five years and later, as general of brigade, its director; in command of various divisions before European War; during war commander of northern armies in France, gaining victories of the Marne and Ypres; known internationally as a strategist and author of *Principles of War and Conduct of War*, published in French, English, Italian, and German; received British G.C.B.

St. Mihiel, keeping their footing across the river at Camp des Romains.

While these operations were taking place on the east and south, the other German armies had proceeded southward in pursuit of the retreating French and English (as related elsewhere). On September 6, the Crown Prince's army stretched from a point southwest of Verdun to the neighborhood of Bar-le-Duc. Verdun was thus almost completely surrounded. But the tide turned with the German defeat of the Marne; they retreated northward and divided right and left at the forest of Argonne. This rocky, hilly forested ridge, about 30 miles long north and south and 8 miles wide, then became the scene of incessant close fighting all through the autumn and winter. In the northern part of the Argonne Forest the Aire runs west to fall into the Aisne. This pass, called the Gap of Grand Pré, pierced as it were by a railway, would have been useful to the French, and so was one objective kept constantly in view by them in the operations of this region. These now took on the character that prevailed farther in the west, trench warfare, with the French pressing the Germans slowly back. Farther south there was much fighting on both sides of the St. Mihiel wedge, and in the Bois le Prêtre to the eastward.

In Alsace, after the second evacuation of Mülhausen, the French took up and held an intrenched position in front of Belfort from Thann to Moos until winter, when they fell back a

*The Battle of the Marne.*—Between the close of the retreat and the battle about to be described air reconnaissances, etc., had revealed the fact that Von Kluck had changed direction to the southeast. The Battle of the Marne opened on Sunday, September 6. On the 3d the British had fallen back of that river and later had taken up a position behind the Seine. About this time (September 4) Joffre had resolved to take the offensive, wheeling up the left flank of the sixth army, pivoting it on the Marne, to move on the Ourcq. The British were to fill the gap between the sixth and fifth French armies. German troops had been reported moving southeast along the left bank of the Ourcq on the 4th and were now halted and facing that river. Heads of columns were also seen crossing at Changis, La Ferté, Nogent, Château Thierry, and Mezy. The Allies' line on the 6th reached from Ermenonville, in front of the left flank of the sixth army, through Lizy on the Marne, Mauperthuis, to Esternay and Charleville, the left of the ninth army under Foch, and so along the front of the ninth, fourth, and third French armies to a point north of Verdun.

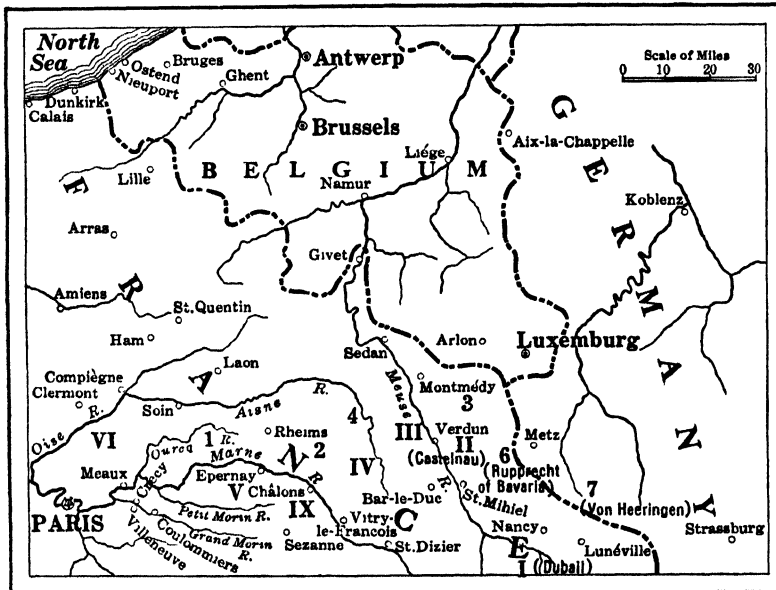
Recollecting, then, that the first and second French armies based on Belfort-Verdun were facing the German seventh and sixth, the French order of battle on September 6 was: the third army (Sarrail) Verdun-Bar-le-Duc, opposed by the German third (Crown Prince); the fourth (de Langle de Cary) across the plain of Champagne, south of Vitry-le-François, facing north, and

opposed to the German fourth (Prince of Württemberg); the ninth (Foch) Mailly-Sézanne, opposed to the German second (Von Bülow); the fifth (d'Esperey) Esternay-Courtaçon, with Conneau's cavalry on his left. The sixth army (Manoury) held a line north and south, with its right at Meaux and its left near Betz. The fifth and sixth armies were to engage Von Kluck. The gap between the fifth and sixth (French) armies was held by the British five divisions and five cavalry brigades, Villeneuve-le-Comte to Jouy-le-Château.

Von Kluck left two corps (II and IV) on the east bank of the Ourcq to hold the sixth army,

while he proceeded with III, IV, and VII to Coulommiers, Rébais, and La Ferté Gaucher to attack the left and centre of the fifth (French) army. He had pushed forward two cavalry divisions towards Coulommiers and Crécy to give notice of any attack possibly coming from that quarter, and had occupied the villages on the west bank of the Ourcq.

The battle began at daylight September 6 by



ARMIES AT BATTLE OF THE MARNE.

Roman numerals indicate French armies; Arabic figures German armies.

III, Sarrail; IV, Langle de Cary; IX, Foch; V, d'Esperey; VI, Manoury.

6 and 7, Heeringen; 3, Crown Prince; 4, Prince of Württemberg; 2, Von Bülow; 1, Von Kluck.

little nearer to Belfort. Trench conditions developed here also, except that there were desperate struggles to take and hold Hartmannswillerkopf, a mountain about 2900 feet high some miles to the north of Thann, which changed hands several times. Apart from various thrusts and points at German territory, the main purpose of the French was to cover the great position of Belfort. In this they succeeded.

the advance of the sixth army against the villages just mentioned, and became general over the whole line from Paris to Verdun. In this struggle the British at once took a hand, and moving northeast, drove back Von Kluck's cavalry and advance guards. In the words of Sir John French, it must have been at about noon "that the enemy realized the powerful threat that was being made against the flank of his columns moving southeast." By night the British had reached the line Dagny-Coulommiers. This retreat of the Germans uncovering the west flank of the troops operating against the fifth army forced these to withdraw and enabled the fifth to reach the Grand Morin between Esternay and La Ferté Gaucher. In the meantime the struggle further east had been most serious. Foch was heavily engaged with Von Bulow, and on his right with Von Hausen. On the whole, the centre had all it could do to hold its own, while the right even fell back a little. The day closed with the balance leaning a little in favor of the Germans, except on their left, when Von Kluck began to realize that he must look to his right as well as to his front. September 7 was a day of desperate struggle, with the Allies progressing in the west, but not elsewhere. On the 8th the German right was definitely turned, and began to retreat. On this day, d'Esperey carried Montmirail, and thus made an opening on Von Bulow's right. Into this opening Foch pushed his left, and he is reported to have discovered a gap between Von Bulow and Von Hausen, of which he also took advantage. The third and fourth armies on this same day held on only by the most devoted courage in face of the equally devoted attacks made upon them. September 9 saw the scale turn in favor of the Allies. The line of the Ourcq was taken; French and d'Esperey joined hands at Château Thierry in the evening. Foch drove a part of Von Bulow's right into the marshes of Saint-Gond and attacked his left with success, while the Saxons on Von Bulow's left, after heavy losses, were pushed back towards Châlons. The third army still held. By the 10th there could be no doubt that the Allies had won a victory: the Germans retreated, and in good order, to the Aisne, where they occupied a line said to have been prepared in advance.

The Battle of the Marne must be regarded as a significant defeat for the German army. Flushed with success, having the initiative, opposed to troops supposedly dispirited by defeat after defeat during a long and exhausting retreat, the Germans found this check as unexpected as the French found it welcome. On the French side moral forces were developed whose intensity continued undiminished. The Germans, although not disabled, were nevertheless compelled radically to change all their plans of operation.

The German position on the Aisne extended from a point on the Heights of the Meuse north of Verdun, west across the Argonne country and the plain of Champagne to Rheims, northwest across the Aisne, west along the Heights of the Aisne to the Forêt de l'Aigle, north of Compiègne. This position was of great strength, carefully intrenched and thoroughly supplied. The Allied armies followed the Germans in their retreat. On the morning of the 13th the British advanced, and in spite of the resistance of the Germans passed the Aisne on pontoon bridges, a remarkable military achievement. The Allied lines, September 21, reached from the extreme south of Alsace through St. Dié, Lunéville, Pont-

à-Mousson, Consenvoye, Grand Pré, Souain, Craonne, Noyon, to Le Catelet. Strong German forces held St. Quentin. In the east the Germans had pushed their way along the promontory of Hatton Châtel towards St. Mihiel and were shelling the forts of Camp des Romains and des Paroches. On the 26th they crossed the Meuse near St. Mihiel. Ypres was occupied on October 14 by the British seventh division, which had assisted the withdrawal of the Allied troops from Antwerp. A period of deadlock now followed on the Aisne, during which each adversary made the most determined efforts to outflank the other on the west.

*From the Aisne to Flanders.*—These efforts were logical for both sides. An attack on the German left, even if successful, would not interfere with their communications through northern France with Belgium and Germany. A frontal attack would have called for resources not then in the possession of the Allies. To turn their right, however, might result in cutting some of the communications, might even save Antwerp. It would in any case assist the retreat of the Belgians and British from that city. Moreover, it was not impossible that the Germans might strike at Calais and Boulogne; it was not inconceivable that they might even push their way as far southwest as Abbeville. Accordingly about September 20 an army was formed west of Compiègne, and its command given to de Castelnau, who was to fill the gap between the Oise and the Somme, and to push his lines north of the Somme; as objectives he had St. Quentin and La Fère. On the 21st de Castelnau's right had moved as far as Noyon; there was violent fighting around Lassigny. From Lassigny the French right moved towards Roye, while their left momentarily occupied Péronne. The Germans in the meantime concentrated a large force in the region, formed in part of troops drawn from the centre on the Aisne, and from Lorraine and the Vosges. On the 25th the French near Noyon were pushed back on that day and the next two, and the whole line as far as the Vosges was engaged. De Castelnau was driven from Lassigny, but during the next few days managed to hold his own. There was now some danger that the Germans would themselves outflank the French; to meet this possibility a new army (tenth, Maud'huy) was formed. De Castelnau was now merely to hold his position. Maud'huy's line ran from the Ancre through Arras and Lens to Lille, and his plan would be to move on Valenciennes. The Germans, who were in force in the region of Cambrai and Douai, planned to take Lille, turn on and force back Maud'huy; at the same time other forces would advance on Boulogne, Calais, and Dunkirk.

The battle opened October 1, and by the 4th the French had been pushed back west of Lens, and were beginning to retire to the hills behind Arras. On the 6th the Germans shelled Arras, and later attempted to take the town, in which they failed. They had succeeded, however, in repelling Maud'huy's offensive, and had prevented the turning of their flank. It was now decided to move the British force from their trenches on the Aisne to the left of Maud'huy, who now, like de Castelnau before him, would remain on the defensive. The situation of the Allies was critical. Antwerp was about to fall, the Lys had been crossed by the Germans and Ypres occupied by them (October 3). The channel ports as well as Lille were in danger.

The presence of Germans in the region about Hazebrouck and Ypres implied an attempt either to intercept the British and Belgians retreating from Antwerp, or to turn Maud'huy's left in the region of Lens. Joffre therefore decided to concentrate still another army between Lens and Dunkirk, which, with the British, was to form the extreme left of the Allies. This army was to be commanded by General d'Urbal, while Foch was to take general charge of the four armies—de Castelnau's, Maud'huy's, French's, and d'Urbal's. The transfer of the British forces was successfully accomplished; they were to take position north of the line Béthune-Lille, attack the enemy opposing Maud'huy's left wing west of La Bassée, and attempt to defend or recover Lille, as the case might be.

The country in which the operations of many months on the left of the Allies were to take place consists essentially of the plain of the Scheldt. This plain is broken by no natural obstacles but is intersected by many canals. The Scheldt bisects it roughly and receives the Lys at Ghent. On the western boundary of the plain rises the higher land running from Calais southeast to Péronne, at the base of which runs a series of waterways, mostly canals, forming as it were a wet ditch to the table-land to the westward. The ditch was held by the French. The Germans occupied Ghent, Bruges, and Ostend, and succeeded in capturing Lille, but were driven east of Ypres by the British. Further south, the Allies pushed the Germans back towards Lille between the Lys and the Béthune-Lille Canal. While these movements were going on the other French armies still further to the south were in conflict with the Germans from Béthune to Compiègne.

This period is signalized by Joffre's third attempt to turn the German right. Lille, although held by the French, was in danger of being cut off by the advance of the Germans west of the city south of the Lys, and the possibility was still strong that the Germans might make a rush for Calais and Dunkirk, or else try to crush the British and Belgians in retreat from Antwerp. Hence Lille was to be saved, if possible, and at any rate the other purposes of the Germans were to be negated at any cost.

The offensive was taken up by d'Urbal's army, the British Seventh Division, and the main forces of the British coming up from the Aisne. On October 11 the Allies engaged the Germans in a position extending from Mont-des-Cats southwest of Ypres through La Bassée to Vermelles. Part of this position was carried, but the main purpose, to drive the Germans out of La Bassée and to save Lille, failed. On the 10th this city had been bombarded; on the 13th it was surrendered. To the north the Allies had met with some success, driving the enemy from Ypres as their comrades were entering Lille. On the 17th the Allies lay approximately north and south from the Forest of Houthulst, behind the villages of Langemark, Poelcapelle, Passchendaele, and east from Ypres to Zonnebeke and south to Wytschaete and Nieppe.

**Battle of the Yser.**—On October 16 the Germans attacked Dixmude and opened the Battle of the Yser. The left wing of the Allies now stretched from Compiègne through Arras, Ypres, and Dixmude to Nieuport. With the command of the sea in the hands of the Allies, the efforts of the Germans were necessarily confined to the fronts Nieuport-Béthune and Béthune-Compiègne. The nature of the ground north of

Béthune greatly influenced the character of the operations, at first rolling, and then, as the sea is approached, flat and open, filled with dikes and ditches. From Nieuport to Dixmude the line was held by the Belgians and French colonial infantry. Then from Dixmude past Zonnebeke came French Territorials and cavalry, then British, who continued on to Béthune. From Dixmude to Nieuport the Yser is canalized, and 15–20 feet above the ground to the west, across which runs the embanked railroad between the same points. As the country could be flooded, the bridge crossings were more than usually important. Off the roads the ground was difficult to cross, by reason of ditches, dikes, etc., and, moreover, was marshy, so that artificial cover could not be made. For eight days, by night as well as by day, the Germans assaulted the Belgian position only to be repulsed and beaten back. The British monitor fleet, mounting 6-inch rifles, did great service shelling the German right and rear, during which Knocke was partially destroyed. The conduct of the Belgians and the French colonial infantry during these eight days was beyond all praise: they had held their position against superior numbers backed by artillery under the most terrible and discouraging circumstances, and had successfully prevented the desperate efforts of the Germans to break through across the position to Dunkirk and Calais.

The plan of the Allies had been to fight a defensive battle on the Yser, and to attack with their centre and right in front of Ypres and south of the Lys respectively. French's specific objective was the capture of Menin on the Lys, halfway between Roulers and Lille, as necessary to an offensive that should take Bruges and thus cut the German communications. To hold the road Menin-Roulers-Ostend was essential to German success, because from it ran out westward all the roads leading to the Allied line between Ypres and the sea. Heavily reinforced on the 19th, the Germans themselves took the offensive, captured Roulers, most of the Roulers-Dixmude road, and all of the Menin-Roulers-Dixmude-Ostend road and railroad.

The Menin operation failed. The plan assigned to Sir Douglas Haig,\* to push through and if possible to capture Bruges, became impossible of accomplishment, for the Germans, in spite of the most determined resistance, in spite of frightful losses, were gaining, and it became evident that the best the Allies could hope for was to hold on until reinforcements could come up. By the night of the 22d the Germans had crossed the Yser Canal at Tervaele, and north of Ypres had pierced the Allied lines. South of that city there was only a thin line, and the right of the Allies was withdrawing from the Givenchy-Radinghem ridge. But on the 23d the Allied prospect brightened. The Forty-second French Division (Grossetti) with howitzers had reached Furnes and relieved the Belgians in Nieuport. On the night of October 23–24, 14 assaults were made on Dixmude and

\* Sir Douglas Haig, born (1861) in Fifeshire; educated at Brasenose College, Oxford; served with distinction in the Sudan and in South Africa; later held important posts of India, being chief of staff (1909–12); was general officer in command at Aldershot (1912–14); general in command in the First Army from landing of expeditionary force in European War (1914); distinguished himself in the retreat from Mons, at the Aisne, at Ypres, and Neuve Chapelle; succeeded Sir John French as commander in chief of British forces in France and Belgium (December, 1915); G.C.B. and Grand Officer of the Legion of Honor of France; author of *Canadian Studies* (1907).

all repulsed. North of Ypres, British reinforcements had come up, moved on the enemy, captured their trenches, and beat back five attempts at recapture, and in the evening of this day a division of the French Ninth Corps was moved into the line.

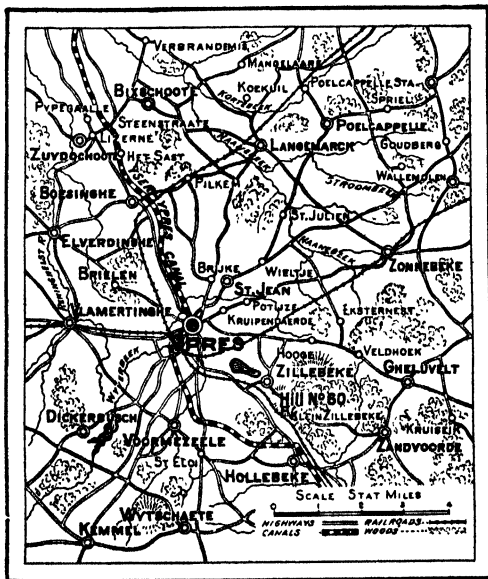
So far the Germans had failed to break through. On the 24th the French on the left stormed Lombartzyde and moved on Westende, thus menacing the German right. To prevent this the Germans opened a determined attack on Nieuport, and along the Yser Canal as far south as Dixmude. These attacks failed. The next day the battle was renewed; guns were mounted on the dunes to beat off the fleet. So tremendous was the effort made that Joffre, October 25, resolved to flood the country. But the water was slow to spread over the meadows. In the meantime the Germans continued their attack, and on the 26th seemed to be in a fair way to reach Pervyse, halfway between Nieuport and Dixmude. On the 28th they attacked all along the line. But in the meantime Joffre was hurrying up reinforcements, and the water was rising. The next day attack after attack was made on Pervyse-Ramscapelle, and the latter place was captured that night. The 30th found the British fleet reinforced by five destroyers, the Germans in Ramscapelle and along the railroad, but between it and the canal embankment the water was mounting. All day the struggle continued for Ramscapelle, the embankment, and Pervyse. The 31st saw the Germans driven back across the railroad and the inundated region east of the canal.

**Battle around Ypres.**—The Battle of Ypres is not a separate event from the Battle of the Yser. They really overlapped, and are indeed only periods of increased intensity of combat distinguished by the prominence of a special objective on the part of the Germans, and of a special effort by the Allies to prevent the realization of that objective. Both of these battles are by the French denominated the battles in

of above and by the expulsion of the Germans from Ramscapelle. The scene now shifts to the southward, to the attempts made by the Germans to capture Ypres in the pursuit of the objective still held by them, to wit, to break through the Allied lines to the French channel ports.

On October 24 the Allied lines ran in a great arc from Dixmude through Langemarck, Gheluvelt, through the woods southeast of Ypres, along the eastern ridge of the Mont-des-Cats, across the Lys, to La Bassée. This position was energetically attacked on this day by the Germans, who very nearly succeeded in taking possession of Gheluvelt. Attacks on Mont-des-Cats were beaten off. At various other points likewise the Allies held. On the 23d a French division had entered Ypres, and for the first time East Indian troops entered the trenches to do battle for the Empire—Gurkhas, Sikhs, etc. They were afterward withdrawn, for climatic reasons, it was said. Fighting continued through the 25th, and on the 26th many attempts were made against Nieuport-Dixmude line. The advantage this day lay on the whole with the Germans, who had moved up the Menin-Ypres road, capturing Gheluvelt, and, south of the Lys, had got hold of part of Neuve Chapelle. On the 28th Gheluvelt was recaptured by the British, who also drove the enemy to the edge of Neuve Chapelle. Returning to the attack, the Germans recaptured the entire village, only to be driven out again, this time by a force composed in part of East Indian troops. Passing over the fighting of the next day or two, on the 28th a wireless was intercepted, saying that the Germans would attack next morning. On that day (the 29th) the French south of Béthune took the offensive so as to keep as large a force as possible of the enemy from joining in the struggle around Ypres. On the 30th and 31st French reinforcements continued to arrive.

The Allied position on the morning of the 31st ran from Zonnebeke on the north to Festubert on the southwest. The eastern ridges of Mont-des-Cats were still held by the Allies; south of this the line extended to the Lys, crossing it and curving around Armentières to Neuve Chapelle and thence to Festubert. The German plan was to hold on the flanks and to make their main attack on the centre to Ypres: if the centre could be broken, and the ridge of Mont-des-Cats captured, the Allied forces would be cut in two, and permit either an advance on Boulogne or an attack south of the Lys against the Allies intrenched there, or indeed both. At daybreak the Germans opened an intense fire on the lines southeast of Ypres and drove the British back into their reserve trenches. An equally violent attack was made across the Ypres-Comines Canal, which also drove back the British. At one or two points the lines were momentarily broken. In general the Germans had advanced in the centre and were within a very few miles of Ypres. In the north the French had taken Bixchoote and reached Passchendaele. On the Yser, at Ramscapelle, the Germans were hurled across the canal, and farther south the French pushed their offensive in the direction of Roulers. But in the centre a tremendous effort was made to crumple up the British line and capture the ridge of Mont-des-Cats and Ypres. The defense made by the British, outnumbered and outgunned, against the successive attacks of the Germans



YPRES BATTLE FRONT.

Flanders, a better name than Yser and Ypres. However this may be, operations on the Yser proper were checked by the inundation spoken



will ever remain remarkable in their annals. These attacks came very near succeeding; the thin British lines, worn out by their efforts to hold, exposed to artillery fire, began to fall back, and the guns were even withdrawn to Ypres. The roads behind the Germans were filled with motor vehicles ready to take the troops to any point of the field. But at this moment the British stood their ground. The Germans coming up the Menin-Ypres road were stopped, and were driven out of the woods east and southeast of Ypres. To the south the defense was equally spirited, keeping the Germans from reaching the ridge of Mont-des-Cats. November 1 the Germans took Wytschaete and Messines, villages at the foot of the ridge, but failed to make the ridge itself. The struggle continued during the whole of this day; the Germans were driven out of Wytschaete, but the village was abandoned. On the 2d Neuve Chapelle was carried, but the attempt on Armentières failed. North of the Lys renewed efforts to gain possession of the ridge of Mont-des-Cats proved unsuccessful. On the 3d the French took the offensive from Dixmude-Nordschoote; the effect of this was to hold back forces that otherwise would have moved against the lines farther south.

And so it went day after day. The Germans made another great effort on November 10, when they shelled Dixmude more heavily than ever before, blew up the French trenches and advanced against the town. After a terrible hand-to-hand fight the French withdrew to the west of the Yser. On the remainder of the front artillery played and assaults were made. The 11th opened with tremendous artillery fire from both sides of the Menin-Ypres road, lasting three hours. Immediately afterward 15 battalions of the Prussian Guard advanced from the east, while at the same time charges were undertaken by other troops. Everywhere north of the Lys the Allied front was attacked. Everything failed except the effort of the Prussian Guard, who got up to within a few yards of the trenches only to recoil and finally to retreat before the blasting fire that greeted them. The Battle of Ypres was over, after having lasted one month, with staggering losses on both sides. It must be accounted a German defeat.

The conclusion of the battles of Flanders, Nov. 11, 1914, marks the beginning of what may be called the long siege of the armies over the whole line from the sea to the Swiss frontier. It was a time of ceaseless watching, of hardship and trial, of continuous fighting with neither side able to advance at the expense of the other. Local advantages gained first by one and then by the other adversary in no way affected the issue, and indeed, as measured by the ground gained, could not be represented on an ordinary map. A word is perhaps not out of place in respect of the nature of the contest that now became the rule over the entire western front. Trench warfare over this front took the place of what may now be called old-fashioned operations in the open. Mining and countermining became the rule: the lines in reality were areas of parallel trenches protected by networks of barbed wire so thickly interlaid and interwoven that only long-sustained artillery fire proved equal to breaking them down in clearing the way for assault. The troops lived in and under the ground, so that the shrapnel, the ideal man-killing projectile against troops in the open, proved nearly useless, and was replaced by the high explosive shell, able to pierce overhead

shelter and overwhelm the occupants. Operations degenerated into a struggle of wear and tear. So close did the lines draw to each other that antiquated methods and weapons sprang into new life: hand grenades, knives, and even clubs for close work. Trench mortars came into existence. Asphyxiating gases, in violation of The Hague Convention, were used. Artillery took a position of first importance, as was but natural, seeing that a state of siege warfare had developed. The reason of this state of affairs is to be found, in part at least, in the air service, making surprise well-nigh impossible, and allowing time for the threatened side to make ample preparations to resist any impending movement. It also greatly increased the efficiency of artillery by enabling batteries to correct their fire, and by discovering and assigning targets invisible from the batteries themselves. In this tremendous struggle some few encounters deserve passing notice before going on to the serious attempts made by the Allies to break through the German lines. Thus the French took Vermelles on December 7; later in the month there was some extremely heavy fighting in and near Givenchy, followed a few days afterward by the capture of St. Georges by the Allies (French and Belgians). Jan. 3-4, 1915, was marked by a French victory at Steinbach in Alsace. Soissons, too, became the scene of great activity. North of this city the French on January 8 captured Hill 132, and pushed their way eastward. The German counter attack, made in force, drove the French in from the east, and finally recaptured Hill 132. The French were compelled to cross the river. Under any other circumstances this action would have constituted a considerable affair; in reality it was only an incident.

The next action standing above the general level was that in the region of La Bassée. On January 25 a German demonstration was made along the whole front, from Festubert to Vermelles and as far north as Ypres. Béthune was shelled. This contest lasted several days and ended in the repulse of the Germans. The French won some success in Champagne during this period, in the neighborhood of Perthes (February 16), and on the whole had rather the better of it until the month of March.

*Battle of Neuve Chapelle.*—The event of this period is, however, the Battle of Neuve Chapelle, an operation carried out by the British. The immediate purpose of the Allies was to carry this village, as the first step in an effort to pass on and capture the ridge Aubers-Ilies, held by the Germans, and curving westward between these two points. If this ridge could be taken, it was not impossible that the attack might even result in the capture of Lille, an event that would have been of the first importance to the Allies, as menacing the German position northward to the sea. Neuve Chapelle itself sits in the easterly angle of a lozenge formed by the roads breaking off from the main road La Bassée-Estaires. The village itself, with the eastern side of the lozenge, was held by the Germans; the western side by the British. Strongly reinforced, the British at 7.30 A.M. on the 10th of March opened a bombardment said to surpass in intensity anything ever heard before. It was effective everywhere except at the extreme north point of the front of attack, where it failed to break down the wire entanglement. After 35 minutes the fire was shifted to Neuve Chapelle, and the British infantry advanced.

In the village and south of it the attack succeeded, but to the northeast was held up by wire entanglement just mentioned. It held off the advance until the artillery succeeded in breaking it up. By 11 A.M. the whole village and wood leading from it northeast and southwest had been taken. So well directed was the artillery fire that the attempt of the Germans to bring up troops was completely stopped. The British, however, made no further progress.

The German fire had cut all or nearly all the telephone wires and communication with the rear became almost impossible. Furthermore the orchard north of the village had remained in German hands and so threatened the flank of the advance towards the Aubers-Illies ridge. There thus arose a delay of four and a half hours, which the Germans took full advantage of to repair their lines, organize fresh defenses in rear, and bring up reinforcements. When the British advanced again, they were stopped both north and south by machine-gun fire.

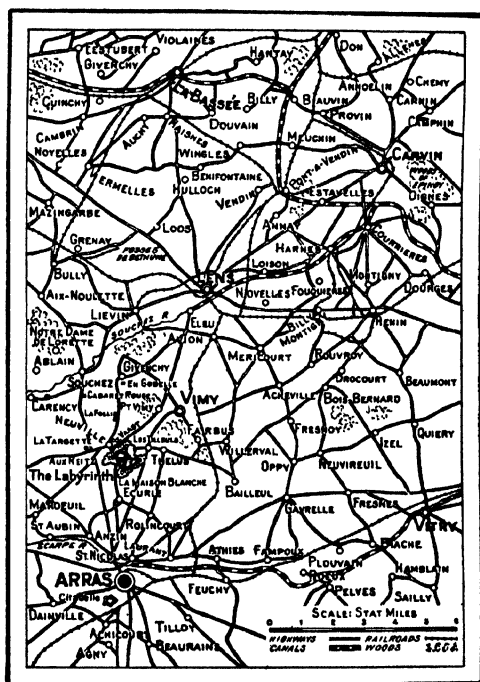
The next day found the British east of Neuve Chapelle, but the remainder of their plan had miscarried. On the 12th the arrival of German reinforcements put the British on the defensive. That night the British set to work to consolidate the positions won, some 1200 yards on a front of 4000. The 13th was taken up in beating off a few German counter attacks. On the 14th the battle died down on both sides. The British casualties were extremely severe, over 12,000 killed and wounded; so also were the German. The net result of the battle was undeniably a British defeat, in that they had failed to carry through their plans. But it is also undeniable that they had managed to break the enemy lines; whether the price paid was worth it, is doubtful.

*After Ypres and Neuve Chapelle.*—In the next month, April, 1915, the Germans made another great effort on a large scale to break through the Allied lines on the north and so gain the channel ports. In anticipation of their advance the British took the offensive themselves on April 17, with the result that, as before in the same region, the German plan was frustrated. The Allies were posted along an arc running from Steenstraete on the Yperlee Canal east, southeast, southwest, through Langemarck, through Broodsende-Becelaere, from which last point the line curved round to Hill 50 and to the Ypres-Comines Canal. The chord of this arc was formed by the Yperlee Canal to a point about a mile southeast of Hill 60. From this position the Allies were driven back to a line close to Ypres, with especially heavy fighting in and near St. Julien, where the Canadian contingent distinguished itself. The Germans even got across the canal at Steenstraete, and for a time the position of the Allies was precarious. In this particular battle of Ypres the Germans made use of deadly gases. By means of these the French troops defending the northern part of the arc were driven out; these gases were later again and again discharged against the British. Until respirators were furnished later, there was no living in the fumes let loose on the trenches under attack. Day after day the contest went on, the Germans attacking and the Allies resisting, with the utmost desperation. On the 30th a vigorous attack by the French pushed back the enemy on the north of the line. On May 8 a concentrated effort—one of many—was made to reach Ypres. Allied (British) attempts to push back the enemy coming

up on both sides of the Ypres-Roulers road were unsuccessful. On the 9th, fresh but unsuccessful attempts were made on Ypres. On this day the French were successful at La Bassée (Carency), the English unsuccessful south of the Lys. On the 11th, Ypres was severely shelled. On the 13th, the British met with some success on the Ypres-Roulers railway, as well as towards the north. The French on May 15 recaptured Steenstraete and got up to the canal; by the 17th they were masters of the left bank.

In its entirety this battle of a month's duration must be regarded as a defeat for the Germans. Setting out to take Ypres and break through, they had, in spite of many local successes, largely at least at the outset due to their use of poisonous gases, failed to carry out their plan. They had lost many thousands in killed, wounded, and prisoners.

During the later part of the struggle around Ypres the British made a second attempt to carry the Aubers ridge with the capture of Lille as the principal objective. The battle opened May 9 and lasted until May 20. The net result was that the Allied lines were ad-



ARTOIS BATTLEGROUND.

vanced some 600 yards over a front of 4 miles. This battle comprised two actions known as Aubers Ridge and Festubert.

*Battle of Artois.*—Before the contest before Ypres, just described, had closed, the French began the tremendous Battle of Artois, on the plateau of Notre Dame de Lorette and south of it, or the line La Bassée-Arras.

If this operation could be carried through, German communications behind it would be threatened and there might be a chance of taking Lille. The German positions on this front were of the strongest.

They held the high ground around Loos, the ridges north of the Souchez stream, and most of the plateau running south of Lens to the banks of the Scarpe. Upon this position had

been expended every effort of modern military science to make it secure. Between Souchez and Arras was a network of trenches known as the Labyrinth (underground), about 2 miles square. The ridge of Notre Dame breaks off abruptly to the south in spurs, the eastern one of which, the Souchez spur, commands Ablain St. Nazaire and a sugar refinery between Ablain and Souchez, held by the Germans. From one of these spurs trenches had been constructed across to the Arras-Béthune road. South of Ablain are the heights of Carency, connected by trenches with Ablain and Souchez, and by another series, the "White Works" (white chalk), with La Targette on the Souchez-Arras road. East of La Targette is Neuville St. Vaast, like the Labyrinth, an underground fortress. In other words, not only was the surface of the ground admirably fortified by elaborate trenches and redoubts, supplied with ammunition, etc., but subterranean areas had been excavated to house troops and supplies, where, safe from aerial observation and overhead fire, they could be kept until needed, to repel the enemy already exhausted and reduced by his advance.

General d'Urbal was in immediate command, assisted by Foch and Joffre, but to General Pétain, later to distinguish himself at Verdun, belongs the credit of the reduction of the Labyrinth. Seven corps were engaged, and over 1100 guns of all calibres had been concentrated for the preparation. For months the French sappers had been occupied in mining the German defenses. The battle opened at 6 A.M. on Sunday, May 9, by the fire of the 1100 French guns. Three-quarters of an hour later the Carency mines were blown up, as were others on the Notre Dame ridge. The bombardment lasted three hours and at 10 the infantry moved out. All day the battle raged. Three of the five trenches on Notre Dame plateau were carried; when night fell the French dug themselves in. South of Notre Dame, at the same time, the French attacked Carency, took the trenches, but failed to take a work on the east. They nevertheless pushed on to Souchez. La Targette was taken, as was part of the White Works. Passing on, a part of Neuville St. Vaast was then captured. On the 10th the fighting continued. On the 11th the attack on Neuville St. Vaast reduced the cemetery, but the Labyrinth still held out. The next day Notre Dame de Lorette fell, as did Carency. From Carency the French pushed on to Ablain St. Nazaire. But the Germans still held on to a spur of the Notre Dame ridge, the spur of the "White Way." On the 21st, however, the spur was carried, as was most of Ablain. A few Germans, however, still held the cemetery, only to be dislodged on the 28th. Three days later the French took the Souchez refinery and in June captured the Labyrinth. Indeed, fighting went on in this region until the autumn. Each side is estimated to have lost 60,000 men in this tremendous battle. Having regard to the ultimate purpose of the French in taking the offensive, it must be admitted that they failed: they had not broken through the German lines. Lille was still in possession of the enemy whose communications were still open. In all probability, however, the Germans had been kept so busy as to have no troops to spare for the attempt on Ypres previously described. And it was further proved that with sufficient preparation by artillery and mining German positions could be carried to a considerable depth.

Simultaneously with the Battle of Artois, there was considerable activity further east in the Argonne region and on the St. Mihiel salient, on the western front of which the French succeeded in capturing Les Eparges. They also met with some success on the southern face, on the edge of the Forest of Apremont. Southeast of Lunéville in the Vosges the Germans took the Ban de Sapt on June 22. In July it was recaptured by the French, who also made some small advances in Alsace.

*Battle of Champagne.*—The French check in the Artois country was followed by fighting chiefly in the Vosges, mostly of a local character. This continued until September, when the French opened an offensive for which they had long been making preparations. Apart from the advantage that would accrue if this offensive should succeed, there were reasons of a political order that called for something more from the Allies than mere nibbling at the German lines. The German campaign in the east was meeting with success. To counterbalance this success, and at the same time to relieve the pressure on the Russians, it was regarded as necessary to deal the common enemy a mighty blow in the west. To keep him ignorant of the precise point at which the blow was to fall, for weeks previous substantially the entire German position was subjected to intense bombardment. Beginning in the middle of August, this bombardment was especially heavy on the Belgian front in the Souchez region, before Arras and Roye, along the Aisne, in Champagne, and finally in the Argonne and Woëvre districts, and in Lorraine. As the time drew near for the infantry work, the bombardment increased in intensity over the front selected for attack. That front was in Champagne, between Auberive on the west and Ville-sur-Tourbe on the east, a distance of some 15 or 16 miles. The centre of the French line was defended by the 6th, 5th, and 4th armies. The front held by the 4th (Langle de Cary) was the one selected from which to deliver the offensive.

Some 4 or 5 miles behind the corresponding German position and roughly parallel to it, runs the Bazancourt-Challerange railway. If the French offensive could reach this railway a mischief would be done to the enemy, for this road communicated with Metz on the east. But the natural strength of the German position had been increased by the arts of the engineer. From Auberive this position followed the crest of the low ridge north of the Suippes River, rising, as it passed through Souain, then by Perthes, with Tahure behind (north of) it, and terminated at Massiges. To say that this whole position was intrenched is scarcely to do justice to the effort spent on its defensive organization; not only were there the usual trenches (lines) facing the enemy position, but cross trenches had been dug over the entire area, from which flanking fire could be delivered upon the enemy if he should succeed in passing the first and subsequent lines. There were really two positions, two miles or so apart, the first immediately in front of the French, the second on the reverse of the ridge. The area between them was a network of trenches and entanglements.

On September 22 the bombardment increased in intensity and was kept up until the 25th, when the French infantry broke out of its own trenches and gained practically the first line positions of the enemy by 12 o'clock noon. At some points, however, the Germans held, and the work therefore became in some sort a series

of isolated and detached actions. On the left the attack was exposed to the German artillery fire from the plateau of Moronvillers, in front it came up against the salients of the ridge. The first line was carried, however, and the right of this attack held all day, and later pushed on deeper and deeper into the German network. To the right of the St. Hilaire-St. Souplet road, much the same thing happened, the French left being stopped while the right managed to advance and took all four lines of trenches. Further east the enemy trenches were penetrated to a depth of about 500 yards, but machine guns stopped the advance. North of Souain the French met with pronounced success, carrying trench after trench almost to the Navarin Farm. Between Souain and Perthes the German position had been most solidly organized, but in its eastern portion the defenses were comparatively weak. Here the French delivered their main attack in this part of the front, the remainder (the left) playing a secondary part. The attack carried the French advance as far as the Souain-Tahure road. In the Mesnil sector (east of Perthes) the greatest difficulties were encountered, but still further east, north of Beauséjour, the French had better fortune, pushing north as far as Maison de Champagne. On the extreme right (Massiges) the colonial troops reached the top of the plateau in an incredibly short time, but could not advance, because of the effective machine-gun fire here developed. The first day's fighting therefore had pushed back the enemy lines in the centre: the flanks had not been driven in, but the French managed to secure the ground gained. In the west, on the 27th, the French got up to the Epine de Vedegrange, but no farther. On the next day the fighting died down in this sector of the battlefield. In the Souain sector the French on the 28th made contact with the second German position in these parts. Between Souain and Tahure, in front of Perthes, contact with this second position was also established, but here the French remained, digging themselves in, until October 6.

While all these events were occurring in the centre and left, the most desperate struggle of all was going on to the north of Massiges. From the plateau three long spurs run down like fingers, whence the name given to them and to the plateau from which they spring, La Main de Massiges. These were strongly held by the Germans. The French accordingly attacked across the back of the hand, and got up on the plateau.

The general result of this battle, the local and separate contests of which were not over before October 4, was that the French gained the Massiges plateau, the Tahure ridge, and various points in the German second position. The elaborate intrenchments and work of the first positions were taken. The total number of prisoners officially given was over 23,000; many guns and much war material fell into the hands of the French. But as in all the other cases of real battles, as distinguished from the daily local strife, on the long front, the German lines were not broken; they were merely pushed back. Although, therefore, the Germans had suffered a defeat in that they had been driven out of their positions, yet it must be admitted, on the other hand, that the French had been disappointed of their purpose. This apart, there can be no question as to the thoroughness of the German defeat. The French staff estimated the German loss in killed, wounded, and missing at 140,000.

*Battle of Loos.*—While this great battle was going on in Champagne, the Allies were renewing their offensive in Artois, the British in the Battle of Loos, the French in that of Vimy. As before in this region, the objective was to push into the plain of the Scheldt. Reinforcements both of men and of guns had given the British the necessary elements to undertake the offensive. Thanks to this increased strength, they had extended their trenches southward to Grenay, opposite to Loos and Lens. It is apparent, therefore, that in the month of September the Allies undertook a general offensive, for in addition to their two mighty efforts in Champagne and Artois, the Germans were kept busy in other regions of the front, by demonstrations on the extreme left, in which the navy took a part, in front of Ypres and also in the Vosges.

In spite of the Battle of Artois, the Germans still held the eastern slopes of Notre Dame de Lorette; from this point their lines stretched north in front of (west of) the Loos-Hulluch-Haisnes ridge to the canal near La Bassée; south, they curved through Angres and Liévin to Souchez, thence eastward of the high road from Béthune to Arras. Between Haisnes and Hulluch lay the powerful Hohenzollern redoubt, a work more or less like the Labyrinth. Their general position thus formed a sort of salient oriented southwestward on the axis Souchez-Lens. The plan contemplated that the British should drive at the northern side of the salient (Loos-Hulluch-Haisnes), the French at the southern (Vimy Heights). The capture of either of these positions would force the evacuation of Lens. The terrain over which the British were to advance was covered with villages, pits, galleries, slag heaps, and mine works generally, all connected by trenches. Moreover, the industrial pits and galleries had been taken over and extended by the Germans for war purposes. The entire area had been defensively organized, and equipped with machine guns, artillery, and small works and trenches generally. In front of the French position, northeast of Neuville St. Vaast, lay the wooded heights of Vimy running northwest to Givenchy with hills 140 and 119 as conspicuous elevations.

Preparations for the great offensive were completed by September 24. Specifically the British were to capture Auchy, Haisnes, Pit No. 8, and the Hohenzollern Redoubt; further south the ridge between Hulluch was to be the objective, involving the capture of Loos, and Hill 70 to the east of the town. The French, as stated, were to attack the Vimy Heights. Amply provided with artillery, the British besides were to employ, for the first time, a gas that stupefied but did not kill. The action opened with artillery preparation on the 24th. During this day the entire German position within range was taken under fire by both the French and the British artillery. On the 25th this fire was renewed very early in the morning, and suspended two hours later in order to allow the infantry to advance. This they did at 6.30 A.M. The French, however, continued the artillery preparation until noon. On the extreme left, between the canal and Pit No. 8, the British met with a serious repulse. Part of the Hohenzollern Redoubt was carried, so was Pit No. 8. Haisnes was taken as early as 8 A.M., but had to be abandoned by 5 P.M. Loos, after a terrible struggle, fell to the English, as did Hill No. 70. A counter-attack by the Germans recovered most of Hill

70. As night fell, the British line ran around the south of Loos to the western part of Hill 70, past the west of Hulluch quarries to Pit No. 8, then east of Hohenzollern Redoubt, and so back to the original position. The fighting was renewed the next day with no material results on either side. By night the line ran back from Hill 70 to the Loos-La Bassée road, then north along this road, then northeast of Hulluch. The remainder of the line was unchanged. On the 27th the Germans recaptured Pit No. 8 and forced their enemies back to the eastern part of Hohenzollern Redoubt. The next few days were filled with desperate fighting, more or less localized. The net result, so far as the British were concerned, was the capture of Loos and a portion of Hill 70.

The French, on their side, advancing a little after 12 o'clock noon, had made but slight progress. They took the Souchez cemetery, but lost it later, and reached the lower slopes of Hill 119. The German garrison of Souchez retired to Hill 119. On the 28th Vimy Heights were attacked; the western slopes and a large part of the wood of Givenchy were taken.

This battle must be regarded as a failure on the part of the Allies. It would seem that the British had no reserves available to clinch the results obtained in their advance. The Germans thus had time to rally and counterattack. It would seem too that the French perhaps made a mistake in delaying their advance on the 25th by six hours. Had they moved out at the same time, the French left and the British right might have joined hands. The Allies' losses were very heavy. The British alone lost 50,000 men in this battle. Disappointed, however, as were the Allies in respect of the main purpose they had in view, both in Champagne and in Artois, they had, nevertheless, made some real gains. In the latter regions they were gradually pushing the Germans to the rim of the plain of the Scheldt. The British gain had, as it were, pushed a salient in between La Bassée on the north and Lens on the south, thus creating in some sort two German salients.

After the battle the French relieved the British from the French left up to and including the village of Loos and a part of Hill 70. The position of the Allies in this new salient of Loos was none too secure. But apart from this, it was clearly incumbent on the Germans to try to recover the terrain they had just lost. They accordingly, on September 29, attacked the northwest face of the British salient, but were beaten off. The French on their side advanced to Hill 140. The next day the German attempts on the northwest face were renewed. October 1 the French made more progress on Vimy Heights. October 3 was marked by a fresh attack on the northwestern face, and most of the Hohenzollern Redoubt was recaptured. On the 8th a counter-attack was made on the British position. It was repulsed with loss, as were the attempts made on the French near Neuville St. Vaast. Later, October 13, these attempts on the French were renewed with very much the same results. On this day the British themselves took the offensive in an effort to extend the northern face of their salient. This effort very nearly succeeded in gaining the Hohenzollern Redoubt for the English, a part of which only was held, however. October 19 the British line ran from Auchez-Hohenzollern, St. Elie, and then, so as to encircle Loos on the east and south, back to the old trenches.

The close of the year 1915 saw the adversaries confronting one another on this as on other portions of the front. But in respect of the northern region it must be remarked that unsuccessful as the Anglo-French efforts to break through had proved, yet they had succeeded in pushing back the Germans to the last ridge of hills separating the area of conflict from the plain of the Scheldt. One more drive like the September one, and the Germans might be pushed into the plain and so lose this part of France. Hence they reinforced their hold by reinforcements estimated at 600,000, and throughout the winter obtained a few minor successes.

*Verdun.*—But these, as well as all the other events, gave way in February, 1916, to the most determined attempt yet made by any of the combatants on any front to win a decision. On the 21st of this month the Germans opened their assault on Verdun. But this place had changed its character since the opening days of the war. Warned by the fate of Liège, Namur, and Maubeuge, it had passed from the condition of fortress pure and simple to that of fortress related to an army in the field. Hence its reduction was no longer a matter of sufficient pounding by 42-centimeter guns. General Pétain\* was summoned to conduct the offense.

The first German drive was delivered against the point of the Verdun salient by heavy columns, over a 7-mile front, from Consenvoye to Azannes. After a prolonged bombardment of heavy artillery—it is estimated that during the first four days no fewer than 2,000,000 shells were fired—these columns struck the French advanced lines, and at the end of a week had advanced 4 miles towards Verdun. The right, advancing along the Meuse, had reached Champneuville; the centre, after taking Beaumont, faced the ridge known as the Côte de Poivre; while the left, after capturing Ornes, threw itself against Fort Douaumont, the most northerly of the permanent forts of Verdun. After several costly repulses this fort was stormed and held by the 24th Brandenburg regiment.

The second phase of the attack shifts to the east. Pushed back to a line running west from Douaumont along the Côte de Poivre to the Meuse, the French now lost Mauheulle and Fresnes. From these points the Germans made their way across the Woëvre plain to the edge of the plateau on which the permanent forts are constructed, and advanced to Eix, about 5 miles from Verdun. The total gains so far amounted to over 100 square miles.

Operations in this sector culminated in assaults on the fort and the village of Vaux, 2 miles southeast of Fort Douaumont. From conflicting reports it would seem that the German infantry finally won the village, but failed to carry the fort and the slopes to the east.

The Germans now turned their attention to the territory west of the Meuse. Their advance east of the river had found its flank exposed to artillery fire from the west. Moreover, it might be possible to cut the western railroad communication of Verdun. Opening in this region on March 6 the Germans, after taking Forges and

\* Henri Philippe Pétain, born in 1857; delivered notable lectures at the Ecole de Guerre, for which he was decorated by King Ferdinand of Bulgaria; at beginning of European War was colonel of the Thirty-third Regiment of Infantry at Arras; distinguished himself in the retreat from Charleroi to the Marne; promoted general of division; in command of an army corps took Carceny, breaking through the German front; in 1915 was in command of part of the "Iron Division" of Colonials in Artois and Champagne; given command of armies around Verdun.

Regnéville found further progress barred by two fortified heights—the Côte de l'Oie and Le Mort Homme, both over 800 feet high. On the lower hills between these points is the wood known as the Bois des Corbeaux, strengthened with entanglements and batteries. Here, finally, the Germans made some gains, so that their advance, some 2 miles south of Forges, brought their line into approximate alignment with their positions farther east, and threatened the French line, strongly posted on Le Mort Homme. Moreover, they had some success as far west as Mélancourt.

In the fifth week of the campaign the point of attack was shifted still farther west, about 3 miles beyond Le Mort Homme. On March 21 the wood northeast of Avocourt, and on the 22d Haucourt Hill, were captured. This left the French positions at Mélancourt and Béthincourt exposed. The greater part of Le Mort Homme, as well as the woods that flanked it, was now held by the Germans.

On the night of March 30 the town of Mélancourt was attacked from three sides, and at dawn carried. The Béthincourt position was thus rendered still more precarious, though the French had succeeded in retaking a small section of Avocourt Wood.

In the meanwhile Douaumont ridge and vicinity were first shelled and then attacked by infantry. A sudden attack gave the village of Vaux to the Germans. The next day Caillette Wood, between Vaux and Douaumont, was penetrated by a strong German attack, but the French first lines, about 300 meters south of Douaumont village, held against a German assault, in which the attack was made in successive waves of great strength.

The struggle over Caillette Wood, the first week in April, although severe, yields in interest to the operations now resumed west of the Meuse. On April 5 the Germans took Haucourt, half a mile southeast of Mélancourt. The withdrawal from Béthincourt was now rendered inevitable, and skillfully made on April 8, with small losses; the new French line was established a mile to the south. Still keeping the offensive and continuing to make gains in this sector, the Germans penetrated the French lines on hills 265 and 295 (near Le Mort Homme), and captured a mile and a quarter of French trenches on Termiten Hill. This latter gain marks substantial progress towards Hill 304, the key position of this whole region. An interesting and novel illustration of the future powers of air craft in actual battle was furnished at Côte de Poivre. As the Germans were bringing up a battery to shell this ridge an air squadron came up and dropped bombs on the battery from an altitude of less than 1000 feet. The first round of bombs killed 9 horses and 30 men, and wounded and frightened so many others that the guns had to be abandoned.

At the end of three months continuous fighting, the Verdun campaign had not reached a decisive issue. Whatever gains were made, however, were made by the Germans. Up to this time they had occupied about 150 square miles of territory, and approximately 30 villages. Their lines were shortened 10 miles (40 to 30) and they had pushed forward an average of about three miles.

On May 4, the Germans again renewed their offensive with increased ferocity. The main attack was again directed against Hill 304 which

dominated the ridge west of the Meuse. The German artillery preparation had been scarcely if ever equaled for rapidity and intensity of concentration. In one week the Teutons made seven attacks. Ultimately east of Hill 304, all the trenches and shelters were destroyed and then carried chiefly by means of poisonous gases. Despite this the hill itself could not be taken. They attacked Le Mort Homme from all sides and finally succeeded in establishing a foothold between it and Hill 304. They then attacked from a new angle and captured Cumières, a village close to the Meuse. A strong French counter attack only succeeded in recapturing a part of the village. The Germans made their farthest advance up to this time when, on May 30, attacking with fresh soldiers drawn from another quarter, they captured Caurette Wood on the east of Le Mort Homme. They now occupied the northern slope and positions well around on each side and threatened to cut the French off from their line of communications.

In the meanwhile the action on the east bank of the Meuse had been rapid. The French by a surprise attack captured Fort Douaumont on May 22, but were unable to maintain their position, inasmuch as the Germans recaptured it in ten days as well as Caillette Wood. Upwards of 2000 prisoners were taken by the German forces. On the east of Fort Vaux the Teutonic forces also made advances. It was surrounded on three sides and its fall was only a matter of a few days. A small garrison of 1000 men was left in the fort to defend it. By most courageous fighting this handful of men held the Germans at bay for five days. They were finally compelled to surrender on June 7.

In the latter part of June the Germans captured the village of Fleury which is only  $2\frac{1}{2}$  miles northeast of Verdun. The French counter-attacked and won back a foothold in the village which they stubbornly maintained and thus offset to some extent the importance of the German victory. West of the Meuse, the efforts of the Germans seemed to be in vain at Avocourt, Cumières, and Hill 304, although they held almost all of Le Mort Homme. However they captured Thiaumont by assault on July 3, and held it until early August when they were driven out by the French. Then followed the spectacle of almost daily changes in possession of the work. It remained ultimately in the hands of the Germans.

The struggle for Verdun now became a deadlock, neither side being able to advance. The Germans were forced to withdraw some of their men from the Verdun front in order to reinforce their position on the Somme. This deadlock continued until the latter part of October, when the French regained in three hours what it had taken the Germans months of effort to attain. It was the most brilliant action of the whole Verdun campaign. General Nivelle planned his attack so that it would occur when the German lines were the weakest and thus have a greater chance of success. His artillery preparations were brief but of exceedingly great intensity. Then came the infantry attack on October 24. It advanced in four columns. The first was between Pepper Hill and Thiaumont Farm. This division advanced about a mile and carried Thiaumont Farm and Thiaumont Work and the Haudromont Quarries.

The second division was to take Hill 320 and the Caillette Wood. It carried both these positions by an irresistible rush. Although this was

all they were supposed to accomplish the commander decided to continue his push forward. Consequently they proceeded beyond the wood and surrounded the Douaumont Fort. The village of Douaumont on the west was captured and then a rush was made for the fort itself. The Prussian defenders refused to surrender and nearly every one of them was killed before the French completely occupied the work.

The third division advanced about half a mile, capturing the remainder of Vaux-Chapitre Wood and all of Fumin Wood. The fourth division pushed the Germans from Chenois and Laufée woods, captured Damloup battery and encircled Vaux Fort on the east, south and west. After the failure of German counter attacks, the French began to finish the encircling of the fort on the next day. It fell on the night of November 1-2.

During the next six weeks there were scarcely any infantry engagements and the artillery actions which occurred were only of minor importance. On the 15th of December, however, General Nivelle executed another great coup. He attacked on a front of 6 miles after a three-day artillery preparation. He succeeded in penetrating the German front for a distance of nearly 2 miles, and according to a Paris report captured over 11,000 prisoners. Vacherauville, Louvemont, Chambrette Farm, Harcourt and Bezouvaux were taken. On the 16th and 17th new gains consolidated the French positions.

After this advance the Verdun front once again became quiet, each adversary watching the other and being content to remain on the defensive. After 10 months of heavy fighting the Verdun struggle was virtually over. In the last analysis it was a great French victory. The moral effects on the French troops and French nation can scarcely be estimated. As a reward for his heroic work at Verdun, General Nivelle was made commander in chief of all the French armies, succeeding General Joffre.

The purpose of the Germans in selecting Verdun as a point of attack gave rise to much discussion. The date of the attack was well chosen, in anticipation of a general Allied offensive on the western front, but Verdun itself had long ago ceased to be a fortress in the technical sense of the word. Hence the German effort falls into the same class as all others, whether German or Allied, to obtain a decision in the west. The effort made at Verdun might have produced better results if made nearer to Paris. Even if successful it would result, moral effect apart, in merely straightening the German lines (accompanied of course by a similar straightening on the French side), unless, indeed, it was believed that a real breach could be made, opening the way for a real advance into the heart of France. It is declared in some quarters that the determining condition of the selection was for political and dynastic reasons the need of a victory for the Crown Prince; and it is further declared that Von Hindenburg and Von Mackensen both opposed Verdun as the theatre of the new offensive. One thing stands out: the enormous losses of the Germans for the sake, so far, of a few square miles of French territory.

*Campaign in Picardy.*—The expected Allied offensive on the western front began in the last week of June by a continuous shelling of the German lines on the British front. The point chosen for the attack was at last seen to be the junction of the British and French lines near the Somme River.

The preparation for the advance was unique. The new mortars of the Allies were first concentrated on the first line trenches of the Germans. They were kept in that position for 10 minutes and then concentrated on the second line of trenches. While firing on these the Allied troops rushed out and easily took the first line. In many cases the trenches were completely destroyed, and the attackers in some instances swept on to the second and third lines. Another unique thing about the battle on this front was the institution of the trench-raiding system, after prolonged shelling. At night a raiding party would rush into an enemy trench and would abandon it as soon as the occupants were bombed or captured. This was also important as a method of finding out the effectiveness of the artillery firing.

The objective of this campaign was the capture of Bapaume and Péronne. The British were to take the former and the French the latter. By the end of the first week the French had advanced about 4 miles and had captured Curul, Estrées and Heur. They took about 800 prisoners. During the same week the British advanced about 2 miles and captured La Boisselle, Thiepval, and Contalmaison. They took about 6000 prisoners. It was apparently the plan of campaign for the French and British armies to advance *pari passu*, inasmuch as in the second week the French just held the positions won and waited for the British to come abreast of them. The British captured Trones Wood for the second time on July 11, and again took Mametz Wood on the next day. On the 15th they captured the village of Pozières and 2000 prisoners. In the meantime the French had advanced eastward and captured Biaches, only 2 miles from Péronne. They had also taken Hill 97, the highest land in the neighborhood and a position which controlled the Somme valley for some distance. The latter part of July saw the French positions consolidated and the British firmly entrenched in Pozières.

In the first week of August the British and Australian troops advanced from their trenches north of Pozières and captured the top of a crest which overlooks Courcellette and Martinpuich. This gave them a direct outlook on their immediate objective Bapaume, which was 6 miles distant over a stretch of rolling country. On August 8 a combined French and British offensive made important gains towards Guillemont, west of Combles. The result was a gain of from 300 to 500 yards on a front of about 4 miles. German counter attacks with the aid of liquid fire succeeded in taking 50 yards of trenches from the Australians northwest of Pozières.

The next Allied advance occurred north of the Somme. The French moved forward from a point opposite Hardecourt (where they joined the British) to the Somme. The advance stopped. The pushing in of this wedge placed Cléry and Guillemont in a pocket. Northwest of Pozières the British, on the 14th, advanced about 350 yards on a front of approximately a mile, while the French further strengthened their position on Hill 109. On the 16th the French made substantial gains north of Maurepas and also south of that town, between it and Santerre. The efforts of the French in driving eastward toward Guillemont, Cléry and Maurepas seemed to indicate that they were going to try to approach Péronne from the north rather than to expose themselves to a frontal attack.



On the 24th Maurepas fell and the French pushed several hundred yards beyond on a 1¼ mile front. This left Cléry almost completely surrounded and left the French in front of Combles, an important railroad centre. The British advanced 300 yards south of Thiepval and put this town in a similar position to that of Cléry. The month ended with the British seizing ground between Guillemont and Ginchy. Strong German counter attacks had been repulsed all along the line.

During the month of September Combles and Thiepval were captured by the French and British respectively. The French salient between Ginchy and Cléry was deepened by the capture of several small villages. The result was that the new French lines were established on the outskirts of Combles. Then south of the Somme a great effort on the part of the French succeeded in capturing Berny, Soyecourt, almost all of Vermandovillers, Chilly and about 2 miles of the railroad running from Roye to Chaumes. During the second week the British thrust out west of Combles and succeeded in taking the entire village of Ginchy. The British lines were now within a few hundred yards of Combles. Taking advantage of this thrust, the French prepared to complete the pocket around Combles. After a heavy artillery preparation, the infantry advanced on the 12th. They advanced a distance of about 2 miles and gained the Peronne-Bapaume road just south of Rancourt. The next day they captured Bouchavesnes and Hill 76. On the 16th and 17th the Allied armies stormed German positions over 4 miles in length. In this advance the British captured the famous "Danube Trench." They also captured the almost impregnable Mouquet Farm which had been the scene of several hard struggles.

On the 20th the Germans made strong counter attacks in order to regain the ground lost to the French north of the Somme. They attacked on a three-mile front for a period of almost 10 hours but were everywhere repulsed.

On the 25th, another great forward movement of the Allies began and resulted in victories on a front almost 15 miles long. The British captured the villages of Morval and Lesbœufs, north of Combles. The French took Rancourt and went right up to the village of Fregicourt. These two movements completely cut off all means of escape from Combles. On the 26th it was taken. The British swept in from the north and the French from the south. A large quantity of war supplies fell to the victors. The British also took Thiepval which was of even greater importance than the taking of Combles, because it had checked them ever since the campaign began. Not content with these gains the Allies pushed on. The British captured a very strong redoubt northeast of Thiepval and were now less than 3 miles from Bapaume. The French advanced east of Rancourt and also entered the Saint Pierre Vast Wood east of Fregicourt.

The first week in October saw a comparative lull in the battle on the Somme. The British and the French made some small advances but seemed to be resting up for a renewed effort. This began on October 7. The Allies by a concerted movement pushed forward over half a mile on an eight-mile front. The British captured Le Sars. The French, breaking through the German Morval-Bouchavesnes trenches, pushed their line to the top of Saily-Saillisel ridge and were right at the entrance to the village of Saily.

South of the Somme the French occupied the village of Bovent on the 10th, and also took a large part of Chaumes Wood. In the next two weeks the Allies extended their lines up to the village of Le Transloy and the French gained a foothold in the village of Saily-Saillisel.

On October 30 the Germans began strong counter attacks. They succeeded in driving the Allies out of part of La Maisonnette and took several hundred prisoners as well as several lines of trenches. The positions gained were the most threatening to Péronne held by the French. The heavy fighting was done by German troops which had been withdrawn from the Verdun front.

In November it appeared that the Allied offensive had spent itself without accomplishing its objective. The heaviest fighting was in the Ancre Brook region, at the northern end of the Somme battle front. Before this operation took place the French had succeeded in tightening their hold on the Le Transloy region and in taking the greater portion of Saillisel. They also captured Ablaincourt, Ablaincourt Cemetery and Pressoire. On the 11th they took the rest of Saillisel. On the 13th began the great drive in the Ancre region. By a surprise attack the British penetrated the whole German front. On the 14th they advanced up the Ancre valley and captured the village of Beaucourt. This gave them a position overlooking Bapaume and straightened out a salient which threatened their lines in this region. Strong German counter attacks in the vicinity of Pressoire resulted in the retaking of part of that village. On the 16th the French counterattacked and succeeded in regaining these positions.

During the months of December, 1916, and January, 1917, the positions on the Somme front remained practically the same. The days were broken by skirmishes and artillery duels and the nights by trench raids, but the extremely cold weather, the fog and enormous shell holes filled with water made any real advances out of the question. Another unique feature of the Somme battle ought to be mentioned here. It was the use by the Allies of great armored tractors. They were carried along on giant caterpillar wheels and could go right over trenches and shell holes without having their progress impeded. They were armed with machine guns and wrought considerable havoc, especially where the ground was anyway level.

The new Allied attack in the west was part of a general plan whereby the Allies attacking simultaneously on all fronts—France, Russia, Italy—hoped to deprive the Central Powers of the advantage they hitherto derived from their interior position of being able to move troops quickly from one threatened position to another. The success achieved in the early part of the new offensive proved the soundness of this plan.

*Continuation of the Campaign in Picardy (Battle of the Somme).*—During the month of December the Allied army devoted almost its entire energies to the improvement of its positions. New trenches were built and the old ones improved. Roads and other means of communications behind them were put in the highest state of efficiency. When the weather permitted further operations the first British object was to drive the Germans from the remainder of the Beaumont Hamel Spur and the Beaucourt Valley. By the end of January, as a result of a series of minor operations, the high ground



north and east of Beaumont Hamel was occupied and they had pushed across the Beaucourt Valley and had gained a footing on the southern slopes to the west.

The possession of this spur gave the British complete artillery control of the Beaucourt Valley and the western slope. The capture of German trenches on the western slope on the night of February 3-4 made the German hold on Grandecourt and the positions west of that place and south of the Ancre Valley very uncertain. The result was that these positions were abandoned and Grandecourt was occupied on February 7.

The British High Command now devised a scheme to carry its line along the spur which runs northward from the Morval-Thiepval ridge about Courcellette and so gain possession of the high ground at its northern extremity. If this were successful it would bring into view hostile batteries in the upper Ancre Valley and would command the approaches to Miraumont on the west. These two attacks were executed on the night of February 17, and continued the next day. The fighting was severe and fraught with counter attacks. The British plans succeeded nevertheless, with the result that, after a heavy bombardment the villages of Pys, Miraumont and Serre were found to be evacuated and were occupied.

The capture of Puisieux-au-Mont on February 27-28 and the villages of Le Barque, Ligny-Thilloy and Thilloy on March 2, had driven the Germans back to the Le Transloy-Loupard line with the exception of the salient formed by the village of Irles. This was taken by assault on March 10. The Le Transloy-Loupard line was now so heavily bombarded that the Germans were compelled to retire to a parallel system of trenches on the other side of the village.

*The German Withdrawal.*—General Haig in his report on May 31, 1917, stated that for some time previous to the middle of March observations seemed to indicate that the area of German withdrawal would be greater than the one described above. It was learned that the Germans were preparing a new defensive line called the "Hindenburg Line," which branches off from the original line at Arras, ran southeastward to Queant and then passed west of Cambrai toward Saint Quentin. Hindenburg apparently feared the salient between Le Transloy and Arras which became more difficult to hold as the British pushed up the Ancre Valley.

On March 14, it was discovered that practically all the German first line trenches before St. Pierre Vast Wood had been evacuated. About the same time it was discovered that the German forces south of the Somme had been greatly weakened. As a result of these observations, the British and French High Commands ordered a general advance for March 17. By the evening of the same day Chaumes and Bapaume had been captured. These were defended by machine guns and infantry left to cover the retreat. On March 18, Péronne was taken by the British in conjunction with the French. By March 20, the British had crossed the Somme River in large numbers and had established a line from south of Germaine, where they joined the French, through Havcourt to Bus. This movement necessitated hasty building of bridges across the Somme. All the old bridges had been destroyed by the retreating Germans. Northeast of Bapaume, Morchies had been occupied.

The Allied advance continued, meeting with little opposition, so that by the first week in April, the British were established on a line running through Selency, Jeancourt, Epehy, Ryaulcourt, Doignies, Mercatel, and Beaurains. This line brought the British and French into contact with the "Hindenburg Line" from Arras to Saint Quentin. This withdrawal on the part of the Germans returned to France approximately 1500 square miles of territory. It was the first time since trench warfare had started that cavalry and large bodies of troops had participated in an open battle. The retreating Germans had completely devastated the country as they withdrew. Roads, railways, and bridges were systematically destroyed. Houses, wells, and orchards were blown up with dynamite. Not a thing was left which could be of the least value to the advancing armies.

*Battle of Arras.*—One of the reasons for the German withdrawal was to nullify any preparations the Allies had made for a spring offensive. This object failed of realization when scarcely a week later the British began an offensive on a 12-mile front north and south of Arras. The battle gradually extended to an offensive over the whole line from Arras to Saint Quentin. The heaviest fighting was done on a line extending from Givenchy, southwest of Lens to Henin southeast of Arras. This line has commonly been called the hinge on which Hindenburg swung his retreat after the battle of the Somme. A four-day artillery preparation of almost unprecedented violence paved the way for the advance. On the first day of the battle, Canadian troops stormed Vimy Ridge, the top of which was literally blown off by the artillery. Four thousand prisoners and large quantities of war material were captured here. On April the British advanced to the outskirts of Monchy-le-Preux, which threatened Monchy and the entire Arras-Cambrai road. On April 11, Monchy fell and on the next day Wancourt and Heninel did likewise.

On April 13, the battle took an entirely new turn. Sweeping northward from their new positions east of Arras the British drove the Germans back on a 12-mile front, capturing six villages and seriously threatening the coal city of Lens. On the 14th the British pushed closer to Lens and on the 15th entered the outskirts of the city itself. For several days no further progress was made because of severe artillery duels, violent counter attacks, and consolidation of positions.

On April 24, the British pushed forward east of Monchy and the next day advanced south of the Scarpe River. Three days later they broke the "Oppy Line," a switch of the Hindenburg line, by the capture of Arleux-en-Gohelle. They also occupied a part of Oppy village (29th), but were compelled to retire from it in the face of heavy artillery fire. On May 3, the British took Fresnoy and part of Bullecourt, but were later forced to give them up on account of heavy counter attacks. It may help to realize the fierceness of the fighting when it is stated that Gavrelle changed hands eight times in one day. The British reentered Bullecourt on May 12, and also took part of Rœux. In the next three days these positions changed hands three times, with the Germans having the better of the counter attacks.

The battle of Arras had now practically come to a standstill. In the first two weeks of June the British were driven back east of Loos, from





Bullecourt and east of Monchy-le-Preux. The Germans had lost 15,000 prisoners and nearly 200 guns. The total effects of the battle of Arras was the placing of Lens in a pocket, the mouth of which was ever growing smaller. This city was a nest of machine guns and all the houses had been leveled so that the German artillery might get a full sweep. The British suddenly shifted their operations to the Ypres sector. (See below).

*Aisne Offensive (April, 1917).* The French pursuit of the Germans after their great retirement was very rapid. Their advance was directed toward La Fère. Without any serious opposition the French reached Tergnier, 2 miles from La Fère. Further south, however, the French struck a snag in the Ailette River which protected the forests of Coucy and St. Gobain. They succeeded in crossing the river and capturing the village of Coucy, but were unsuccessful in their attempts to capture the forest of St. Gobain, which was one of the main defenses of the Hindenburg line. Moving their line eastward the French pushed the Germans back along the Oise River and thus threatened the German hold on St. Quentin. In the meantime the British had thrown a semi-circle around St. Quentin on the north and west of the town so that the artillery controlled the approaches to it. All attempts on the part of the Allies to take the city failed, however.

On April 16, the French launched a great offensive on the Aisne River. They attacked on a 25-mile front from Soissons to Rheims. The Germans had held this line since their retreat from the Marne. For 10 days French artillery had prepared for the offensive and for a similar length of time the Germans had been bringing up great quantities of men and guns to meet the expected attack. A successful attack by the French would threaten the important city of Laon. On the first day the entire German positions on the front line were taken along with 10,000 prisoners. By the end of the third day the French had taken 17,000 prisoners and 75 guns. The villages of Chavonne, Chivy, Ostel, and Braye-en-Laonnois were captured. Further west on the southern bank of the Aisne the French captured all of Vailly and an important bridgehead. Hindenburg brought up thousands of fresh troops and on April 19, delivered one of the strongest counter attacks of the entire war between Juvincourt and Berry-au-Bac, but they were thrown back in disorder after furious fighting. On the same day the French advanced on the eastern end of the battle front in western Champagne and threatened the town of Moronvillers.

On April 20, the French pressed the Germans back toward the Chemin des Dames, an important road running along the top of the heights north of the Aisne River. In this sector Malmaison fort protecting the road from Soissons to Laon prevented further French advances. For the next 10 days there were severe artillery duels and numerous local engagements and counter attacks, with the advantage usually with the French. The terrain of the Aisne territory was peculiar. It consisted of limestone cliffs, which were honeycombed with natural and artificial caverns, which were practically immune to French artillery fire. This necessitated fierce hand to hand struggles, sometimes far underground.

On May 4, Craonne and several strong points

north and east of it, as well as the German first-line positions on a front 2½ miles northwest of Rheims were taken by the French. Craonne is on the southern end of the Chemin des Dames ridge. Counter attacks of unprecedented violence failed to shake the French grip on the Ladies' Road (so called because it was built by Louis XV as a promenade for his daughters). They gradually pushed ahead from the eastern and western slopes until they controlled the entire road and thus overlooked the Ailette River and valley from which the heights of Laon rise. Almost ceaseless counter attacks were made against the newly won French positions but completely failed, despite temporary local successes. The French completed their operations by driving the Germans across the Ailette River (October, 1917), and then turned their energies to the Battle of Flanders (see below).

*French Success at Verdun.*—On Aug. 20, 1917, after nine months of comparative quiet the French resumed the offensive at Verdun. After a three-day bombardment they advanced on both sides of the Meuse and penetrated a mile and a quarter on an 11-mile front. They captured Avocourt Wood, Le Mort Homme, Corbeaux and Cumieres woods, Côte de Talou, Chapneville, Mormont farm, Hill 240 and 4000 prisoners. In the next four days smashing blows were delivered which resulted in the capture of Regnéville, Samogneux, Côte de l'Oie and 15,000 prisoners. By the 15th of September the French had recovered 100 square miles of the 120 the Germans had seized in their great offensive. They now held all the dominating positions in the Verdun sector and strong German counter attacks failed to dislodge them.

*Battle of Flanders.*—On June 7, 1917, occurred one of the most spectacular battles of the entire war, that for the Messines-Wytschaete ridge. This ridge formed a salient which dominated the entire Ypres sector and which was literally a thorn in the side of the Allies. For over two years British sappers had been burrowing under this ridge and finally succeeded in placing in position, undetected by the Germans, 19 mines containing more than 1,000,000 pounds of ammonite. These were exploded by electricity on the morning of June 7. It was like a tremendous earthquake. The whole tops of the hills were blown off and the roar could be heard for a distance of 150 miles. A tremendous shell fire which had been playing on the ridge for two weeks reached its greatest intensity as the mines were exploded. After the explosion the British infantry rushed forward and by the end of the day had wiped out the entire salient. Seven thousand prisoners and many guns were taken with relatively small losses to the attackers. Even the rear protecting positions were taken. The attack was on a 5-mile front and penetrated to a depth of 3 miles.

The Germans retaliated for this Allied success by a successful attack on the Allied line at its most northern extremity in Belgium. On July 11, after strong artillery preparation, the Germans made a strong infantry attack on the British positions east of the Yser River. The British line at this point was about 600 yards east of the river. Their entire lines of communication had to cross the river to supply the first-line trenches. The Germans completely destroyed the lines of approach and captured or killed the entire British force east of the river (about 3000). Twelve hundred prisoners were taken.

The reduction of the Messines-Wytschaete salient prepared the way for further Allied activities in the Ypres sector. Consequently, on July 31, 1917, the British and French began an offensive which lasted intermittently down to the beginning of 1918, when weather conditions forced a halt. The objects of this offensive were to compel the Germans to give up their submarine bases at Ostend and Zeebrugge and to envelope the important industrial centre of Lille. For three weeks previous to the above date, the artillery preparations on both sides had been stupendous. The infantry attack was on a 20-mile front from Dixmude to Warneton. The first attack passed the German third-line trenches. On August 1, a severe rainstorm lasting 50 hours began, and perforce held up further operations. On August 10, Westhoek village and ridge were carried by storm. The French took Bixchoote. The next day the British attacked in Glencorse Wood. The artillery battle reached heights never before attained. Both sides seemed to have unlimited supplies of ammunition. The German and Allied barrage fires were wonderful to watch. On one occasion five distinct British barrages were counted. The Germans devised on this front a new method of defense. The trench system was practically given up and concrete redoubts, called by the British "pillboxes" were erected in the shell holes. They were nests of machine guns and were often invisible to airplanes. This did away with the necessity of keeping great quantities of troops in the forward trenches and allowed the advance lines to be held by scattered forces. The terrain was also peculiar. The heavy torrents of rain made the flat ground a veritable quagmire. The infantry sank up to their knees in mud and it was almost impossible to bring up heavy artillery.

On August 16 the Allies struck again on a 9-mile front north and east of Ypres and carried practically all their objectives. On the left the French drove the Germans from the salient between the Yser Canal and Martjevaart and captured the bridgehead at Dreigrachten. In the centre the British captured the strongly fortified position of Langemarck and pushed forward for another mile. On the right the British failed to capture the high ground almost due east of Ypres. They seized it in their first assault but were compelled to give it up. Weather conditions prevented any further operations for an entire month.

From the middle of September to the middle of October five brutal assaults by the Allies made a great salient into the enemy positions. On September 20, an attack began on an 8-mile front between the Ypres-Comines canal and the Ypres-Staden railway. This resulted in the capture of Inverness Copse, Glencourse Wood, Nonne Boshen, Potsdam Vampir, Iberian farm, and Gallipoli. All of these places were named by the Allied troops in front of them. In the centre Veldhoek and part of Polygon Wood were taken. All of these gains were consolidated. On September 26 came another great smash at the German lines. Driving on a 6-mile front, Tower Hamlets Spur, the remainder of Polygon Wood and Zonnebeke were taken. The advance was approximately  $\frac{1}{2}$  mile. On October 4, the Allies again attacked on an 8-mile front. The British gained control of the Passchendaele ridge (their immediate object in the Flanders battle) as far as Broodseinde. The weather

prevented any further attacks or counter attacks. On the 9th, a fourth concerted blow captured St. Jean de Mangelaere and Poelcappelle. On the 12th, another attack, interrupted by the weather, brought the Allies up to within 500 yards of the town of Passchendaele. These five blows captured an area of approximately 23 square miles and carried the Allies to the Ypres-Roulers road on the northeast as well as an advance of a mile over the Ypres-Menin road. Roulers was now in the range of the heavy artillery, which was also able to sweep the Flanders plain. The losses of the Allies were comparatively slight.

After a brief lull the Battle of Flanders was continued on October 22. On that day the British and French advanced on both sides of the Ypres-Staden railroad. The French secured the southern part of Houthoult Forest and a number of fortified farms. The 26th saw another big advance in the same direction. The British advanced west of Passchendaele and north of Gheluvelt, while the French took Draebank and several more fortified farms. On the 28th the French and part of the reorganized Belgian army captured the Mercken peninsula (formed by canals on three sides) south of Dixmude. On the 30th the British advanced from the positions won by them on the 26th and captured most of Passchendaele, but were compelled to retire in the face of heavy counter attacks. A week later after heavy bombardment, the Canadians advanced, took the town and continued 800 yards beyond it. Furious German counter attacks in the next few days failed to penetrate the new British line. The British then proceeded to clear the rest of the spur by advancing northwest of the town. They were now within 5 miles of Roulers. The entire Ypres front remained practically the same until the beginning of 1918. The British efforts were turned to the battle that developed at Cambrai and the Belgian front was the scene of heavy artillery duels and trench raids carried out to relieve the pressure on the Cambrai front.

*Battle around Cambrai.*—On Nov. 21, 1917, began one of the greatest battles of the year in the region around Cambrai. For a time it appeared as if the British were going to smash the Hindenburg line to pieces. Then the Germans started a counter offensive which almost nullified the British gains. The battle was a surprise attack without artillery preparation, a method practically unheard of in the present war. The attack was on a 35-mile front between St. Quentin and the Scarpe River, although the main part of it was due west of Cambrai. Huge "tanks" screened by smoke led the advance and plunged through the German defenses as though they were paper. The first day netted 5 miles, 8000 prisoners and a number of guns. General Julian H. G. Byng was in direct command of the operations. The villages of Benavis, La Vacquerie, Ribecourt, Havrincourt, Marcoing, Graincourt, Anneux, and Noyelles-sur-l'Escaut were captured as well as several forests and fortified farms. Part of Bourlon Wood, the dominating height around Cambrai, and part of Bullecourt were also taken. The village of Fontaine Notre Dame,  $\frac{3}{4}$  of a mile from Cambrai, was captured but the Germans retook it the next day. Open fighting prevailed and the cavalry played a big part in the British advance.

On November 23 the British attack was re-

newed and a bitter struggle ensued in the neighborhood of Mœuvres (south of Bourlon Wood) and at Crèvecoeur, south of Cambrai. The British took a hill dominating the former position. Cambrai was under British shell fire and Queant was in serious danger. Bourlon Wood and village changed hands several times. The Germans made tremendous efforts to hold these dominating positions, but the British held on to them tenaciously until encircled by German troops and finally driven out of the village. Cambrai was heavily shelled from the Bourlon Wood.

On November 30 the Germans began a grand counter offensive on a 16-mile front on the north, south, and east sides of the British wedge. On the north and east they failed to gain, but on the south they reached La Vacquerie and Gouzeaucourt taken by the British on the first day of their offensive. On December 2, after ten attacks the Germans occupied Masnières. The German reports stated that 6000 prisoners and 100 guns had been taken by them up to Dec. 4.

The success of the German counter drive on the south compelled the British to rectify their line on the eastern side. Consequently they withdrew from Bourlon Wood and gave up Noyelle-sur-l'Escaut, Anneux, Cantaing, Graincourt, and Marcoing. Approximately one-half of the territory gained by the British was regained by the Germans. American engineers, working behind the British lines, were caught when the Germans broke through. They seized guns from fallen soldiers and fought valiantly. Several lost their lives.

The entire western front was now alive with artillery action from the sea to Switzerland. All the European newspapers predicted a big drive "somewhere on the front." A furious attack west of Cambrai on December 13 was repulsed by the British. The Germans attacked between Bullecourt and Queant (10 miles) in mass formation but were unable to break through. The line on the entire front was the same at the beginning of 1918, because winter put an end to any further operations.

*Allied Unity.*—The prime ministers of France, Italy, and Great Britain met at Rapallo, Italy, on November 9 and formed the Supreme War Council, which was to coördinate the military powers of the Allies and wage war as a unified group and not as individuals. The members of the Supreme War Staff were to be Generals Cadorna (Italy), Foch (France), and Wilson (British). According to the agreement, "The Supreme War Council has for its mission to watch over the general conduct of the war. It prepares recommendations for the considerations of the governments and keeps itself informed of the execution and reports thereon to the respective governments."

On November 7, 1917, a United States Commission headed by Colonel E. M. House arrived in London to consult with the Allies. Secretary of State Lansing announced that the object of the mission was "a more complete coördination of the activities of the various nations engaged in the conflict and a more comprehensive understanding of their respective needs, in order that the co-belligerents may attain the highest efficiency. He strongly emphasized the fact that it was a war and not a peace conference. Most of the other Allies sent representatives with the same objects in view. President Wilson cabled to Colonel House that "unity of plan

and control" were essential and he told him to attend the first meeting of the Supreme War Council. Colonel House returned in late December, and urged the hasty despatch of American forces to Europe, as well as the speeding up of shipbuilding, and the securing of Allied unity.

*American Expeditionary Force.*—The first contingents of a United States Army to fight in Europe arrived at a French port on June 26-27, 1917. They were commanded by Major-General William L. Sibert and received a tremendous ovation from the French people. The transports on the way over had been unsuccessfully attacked twice by submarines. Gen. John J. Pershing, the Commander-in-Chief of the American force had been in France for some time preparing for the coming of the "Sammies" as the French characterized the American soldiers.

Training camps for the American troops had been located in various parts of France and were ready for occupancy when the soldiers arrived. Infantry, artillery, aviation, and medical bases were established. The number of men gradually increased, many of them stopping in England before going over to France. An intensive system of training was entered upon during the latter part of July. The instructors were officers and men of the British and French armies. The American transportation service took over all railways leading to American bases and a section of French forest was turned over to American lumbermen to supply the needs of the expeditionary force.

The news that American forces were in action "somewhere in France" was given out in a dispatch on Oct. 27, 1917, which stated that the artillery had fired the first shot and that the infantry had entered the first-line trenches. The activities did not mean that American troops were taking over a section of trenches on the western front, but that they were completing their training under actual war conditions. A few nights later the Americans crept out into "No Man's Land" on reconnoitering expeditions. Every so often the troops in the trenches were changed so that as many troops as possible could get a taste of real war conditions. On November 3, the Germans announced the capture of American prisoners when a salient which they occupied was cut off from the main trenches by a barrage fire. The Americans lost 3 killed, 11 wounded, and 11 missing. Although no official announcement was made as to the exact location of the sector, a comparison of the various reports seemed to show that the region was in the Vosges Mountains where the Rhine-Marne Canal crosses the boundary line between France and Lorraine. During November and December, 1917, intermittent artillery duels and engagements between patrols occurred, but no conflict of any size developed.

**III. Eastern Theatre.** An unexpected blow by the Russians through East Prussia early in the war had almost upset the German plan, but for the superior generalship of Von Hindenburg (Tannenberg). Meanwhile the Austrian advance to hold the main Russian armies failed in the rout through Galicia, and October, 1914, found the Russians astride the Carpathians. To save the Austrians, Germany hurried troops from France and organized a counter-offensive through Poland, which developed during the winter and spring, 1914 and 1915, and drove the Russians far behind their own frontier.

Trench warfare marks this front during 1915-16 until June, 1916, when the Russians, finding Austria advancing in Italy and Germany engaged at Verdun, once more began a successful drive through Galicia that reacted on the Italian and Verdun fronts.

The detailed account of these military operations falls under the following heads: (1) Russian drive into East Prussia, outgeneraled by Hindenburg and culminating in defeat at Tannenberg; (2) Austrian advance through Galicia to cut the Kiev-Warsaw railroad; (3) defeat of this Austrian campaign and pursuit by the Russians to the Carpathians; (4) German advance in Poland, including first attack on Warsaw; (5) siege of Przemyśl; (6) Austro-German advance in Galicia, with rout of Russians, including loss of Poland, and taking up of intrenched line from Riga to Dvinsk to Lutsk and down to the outer Bukowina border; (7) Brusiloff's drive into Galicia, June, 1916. The struggle on the east front was conditioned by a number of circumstances. We have first the German plan itself, to smash the French and then turn upon the Russians before they could get ready. A corollary of this proposition was the retention on the east front of but few troops. Next we must take into account the fact that the Russians mobilized and were in readiness far faster than any one thought they possibly could. Lastly, and of paramount importance, is the nature of the terrain and its organization in view of war, and then the configuration of the frontier itself. The striking feature of this configuration is that Russian Poland projects like a huge bastion between Prussia on the north and Galicia on the south. The political frontier separating the contiguous states is, on the whole, not a military frontier. Hence Russian Poland lies peculiarly exposed to attack from the north, west, and south. On the German frontier of East Prussia lie the Masurian lakes, forming a natural obstacle to invasion either east or west. On the south, and some distance from the political frontier, stretches the Carpathian Range, the natural protection of Hungary. Through this great central plain run many rivers; chief of these are the Niemen in Courland and Kovno, and the Vistula roughly bisecting Russian Poland. In Germany the foresight of the general staff had furnished a complete network of railways, but in Russia and in Russian Poland there were comparatively few. The German frontier was protected by important fortresses—Königsberg, Graudenz, Thorn, Posen. In Russian Poland, besides the fortified capital, Warsaw, there were Novogeorgievsk, northwest of Warsaw, and Ivanogrod, southeast, and the line of fortresses along the Narew River terminating in Ossowiec (on the Bobr). East of Warsaw, at the junction of the railways from Petrograd and Kiev, lies Brest-Litovsk on the Bug. It stands on the western rim of a great stretch of almost impenetrable marshes, the Pripet Marshes.

Russia at once took the offensive. But it was plain that before she could advance, or attempt any great movement from her own domain of Poland, she would have to clear both East Prussia and Galicia of the Germans and Austrians respectively. The German idea apparently was to hold East Prussia and the remainder of the frontier to Galicia, while Austrian armies were to advance northwest into Poland, and eastward into Volhynia, and thus hold off or engage any Russian forces that might under-

take operations in this region. The Russian commander in chief was the Grand Duke Nicholas (q.v.), until superseded by the Czar (Nicholas II) in September, 1915.

*Invasion of East Prussia.*—Whatever the motives that induced the course, the Russians opened the campaign by an invasion of East Prussia. Three railways cross the frontier of this province—the main line Petrograd-Berlin, at Wirballen; the Bialystok-Lyck railway; and the Warsaw-Danzig, through Mława and Soldau. The Germans had made no effort to fortify their frontier save in so far as the great positions of Königsberg and Danzig may be said to have fortified it.

In August, 1914, at the outset of the war, the Russians sent in two armies, one from the Niemen, resting on the fortresses of Kovno and Grodno, under General Rennenkampf (q.v.), and the other from the Narew under Samsonoff, each of them about 250,000 strong. Rennenkampf was the first to come into contact with the Germans under Von François, who, seriously outnumbered, fell back after fighting delaying actions to Gumbinnen, where on August 20 after a stubborn resistance he was defeated. He retired on Insterburg, but made no attempt to hold the place, which was entered by the Russians on August 24. Rennenkampf now continued his advance west and southwest, clearing the country, and approached closely to Königsberg, without however really menacing that formidable fortress. Samsonoff, marching northward, found only inferior numbers to oppose him, engaging them at Soldau, Neidenburg, Allenstein, and Frankenau. The result of the campaign so far had been to drive the Germans out of a great part of East Prussia, where two armies, totaling nearly 500,000, were about to join hands. Samsonoff's army occupied the line Soldau-Alenstein-Frankenau while Rennenkampf's ran northwest-southeast along the line Friedland-Angerburg. The situation was serious for the Germans, who had left but few troops (5 corps of the active army) in this region of the theatre of war.

After their initial successes in East Prussia the Russians pushed their cavalry patrols almost to the lower reaches of the Vistula. It was even reported that they had begun the investment of Königsberg. Apart from sentimental reasons, the permanent retention by the Russians of East Prussia would have paralyzed German efforts in that region, and affected the whole course of the war in the East.

The business of clearing the country of the enemy was intrusted to Von Hindenburg, a retired general thoroughly acquainted with the topography of the region. His first task was to assemble an army, which he did from the troops that had retreated before the Russians, from part of Von François' army and from the Vistula fortresses. He thus got together some 150,000 men, with whom he advanced into East Prussia. The two Russian armies had in the meantime become separated, Rennenkampf going down the railway from Insterburg towards Königsberg, while Samsonoff had got as far west as Osterode, where lay his right with his left further south along the Soldau-Ortelsburg Railway. Far outnumbering Von Hindenburg, Samsonoff could derive no advantage from his superior strength because his troops were, so to say, tangled up in the lake-and-swamp region in which they had become involved.



Von Hindenburg stood with his left near Allenstein, across the Osterode-Insterburg railway, his centre near Gilgenburg, and his right at Soldau. With his front protected by the nature of the ground, the roads on his flanks gave him opportunity, should it be necessary, to pass troops around either flank. Having, on August 26, repulsed the Russian attacks, Hindenburg on his right forced the enemy back towards Neidenburg, and thus got control of the road to Mława. To meet this German effort, Samsonoff strengthened his left, and on the 27th tried to win back the road. In this he failed; his centre at the same time fell back. Meanwhile Hindenburg had been sending men by the thousands northeast, past Allenstein, to envelop the Russian right. On the 28th and 29th there was severe fighting for the possession of Passenheim, on the railway from Ortelsburg to the main line, in which the Germans were successful. But one line of retreat was now open to the Russians, the road running east through Ortelsburg towards Lyck, with the Germans well to the eastward of Passenheim. The Russians by this time had both their flanks turned and their centre driven in, and that by an army markedly inferior in numbers. Accordingly on the 30th the retreat began, and on the 31st the destruction of Samsonoff's army was complete. He was himself killed, 90,000, and possibly more, prisoners were taken, 30,000 or more killed and wounded, guns lost by the hundreds, and all sorts of stores abandoned. Samsonoff had marched into a trap and there been crushed by inferior numbers compensated by superior generalship, extreme mobility, freedom of movement, and control of communication. Barely more than one corps of the five composing the army managed to escape. See TANNENBERG.

The battle over, Hindenburg set out northeastward. But Rennenkampf had fallen back towards the Niemen on hearing of Samsonoff's fate. He fought a rear-guard action at Gumbinnen, followed by more fighting at Augustowo, and retired behind the Niemen, September 23. Von Hindenburg tried the crossings, failed, was pursued by Rennenkampf, and after suffering severely in the Augustowo morasses (Oct. 1-9) was relieved to take command in Poland. In the meantime the centre of interest had shifted to Galicia.

*Conquest of Galicia.*—The German plan of campaign contemplated, as we have seen, the crushing of France, while Russia should be held by the Central Powers. In form, so far as Austria was concerned, this holding was to be an invasion of Russian Poland. South of the frontier two railways run roughly parallel to the boundary, and from these two run branch lines and feeders. The Russians were not nearly so well off in the matter of transportation. Given, therefore, the supposed slowness of Russia's mobilization and the poverty of her rail system, an invasion of Russian Poland seemed to be a promising undertaking. It would at any rate hold Russian forces in the region and thus prevent their coöperation with those invading East Prussia further north. The invasion was made by two armies, the first under General Dankl, of over 300,000 men, with its base on Przemyśl and Jarosław, and for its objective to push northeast to Lublin and Kholm, and cut and hold the Warsaw-Kiev railway. This done, Brest-Litovsk would be threatened and with it communication with Warsaw. To protect this army on the right

and rear, a second army under General von Auffenberg\* was to advance northeast from Lemberg. This army mustered also probably 300,000 men. A third, or reserve army, under the Archduke Frederick, was sent forward on Dankl's left in the direction of Kielce. If with this offensive we couple a German offensive coming down from the north, and the possibility of troops from Silesia joining hands with the 3d Austrian army, it must be admitted that the plan of attack was not without merits. But as a matter of fact, the Russians by the end of August, 1914, had brought into Galicia from Kiev and Odessa armies totaling more than 1,000,000 men. They allowed Dankl to advance, practically unopposed, almost as far as Lublin. There was a battle at Krasnik, in which the Austrians were successful. The real Russian strength all this time was gathering behind Lublin and Kholm, where two armies under Ivanoff waited for the moment to strike. When September came, the Austrians found opposed to them, in this region, forces at least as great as their own.

In the meantime Von Auffenberg had pushed on to Tomaszów, his purpose being, as already stated, to guard Dankl's right. Contact was established August 11 at Brody, and two days later at Sokal, where the Russians were successful. On the 17th began the general advance against Austria. The commander in chief on this front was Ruzsky (2d army), assisted on his left by Brusiloff† (3d army), who between them had over 600,000 men. On discovering the strength in front of him, Von Auffenberg drew reinforcements from the reserve army. It is possible that on both sides there were not far from 1,200,000 men, with the advantage slightly in favor of the Russians.

On August 17 Ruzsky attacked Von Auffenberg. He crossed the frontier on the 22d, as did Brusiloff further south. On the 23d Brusiloff drove the Austrians out of Tarnopol; they fell back on the Złota Lipa, where they made a stand, but were finally beaten back in the direction of Halicz. Ruzsky in the meantime had been thrusting at the Austrian left and centre. The Austrians finally took up a strong position 70 or 80 miles long in front of Lemberg, and extending from Busk in the north to Halicz in the south. Here they were attacked on August 26-27 by Brusiloff and Ruzsky together, and beaten, their right having been turned at Halicz, and their left thrown back.

The result of this great battle was that Lemberg fell into Russian hands, and that the Austrians retired in disorder. The losses on both sides were very heavy. In prisoners, the Austrians are said to have lost 100,000. Lemberg, on account of its rail connections, was a valuable capture. On September 4, after the defeat of Von Auffenberg, the Russians opened on

\* Moritz, Ritter von Auffenberg, born (1852) in Tropau, Silesia; became lieutenant (1871); field marshal (1905); Austro-Hungarian Minister of War (1911); general of infantry; commander of a corps at beginning of European War and won victory of Kamarów; retired soon after; accused of plot to sell military secrets to Russia and imprisoned at Spandau (1915).

† Alexei Alexeievitch Brusiloff, born (c. 1860) at Kutais in the Russian Caucasus; of a family long distinguished in Russian military and political life; educated at Tiflis and in a military school; gained a reputation for horsemanship and was chosen aid to General Sukhomlinov, then head of the Cavalry School for Officers at St. Petersburg; with Grand Duke Nicholas he witnessed the French army manoeuvres; rose to be general of brigade and of division, and after 1910 commanded an army corps, being stationed successively at Lublin, Warsaw, and Vinnitsa.



Dankl. There had been more or less fighting before this date in the region between the two Austrian armies, e.g., at Tomaszow, where the Austrians were seriously beaten; the Russian front Lublin-Kholm had itself been attacked, but without effect. Under the pressure of the Russians, Dankl was forced to fall back on a front of 75 or 80 miles, with the Vistula on his left, to the river San (September 12), a retreat that was a running fight between the Austrian rear and the Russian advance. This struggle developed into genuine engagements at various points, as at Krasnik.

Auffenberg, after Lemberg, took up another position, Grodek-Rawa-Ruska. He had been reinforced, and his position was strong. But, nevertheless, his left (Rawa-Ruska) was crushed, after a most gallant resistance lasting over a week, and when Grodek was carried (September 14) his defeat was complete. The Russians pushed on vigorously, captured Jaroslav (September 21), and drove the fragments of Auffenberg's army into the defenses of Przemyśl.

The passage of the San cost the Austrians very heavily in men, in supplies, and war material. A Russian force that had crossed the Vistula at Josefov marched up the left bank of that river, and reaching the San at the same time as the main body, defeated an Austrian force on this side and took Sandomierz.

The Russian campaign so far had been successful. Their victory at Tomaszow interposed them between the two Austrian armies. The defeat of the 2d had left the 1st in a serious situation, for which immediate retreat was the only remedy. This retreat was one succession of defeats. The general result was the crowding of the two armies into the region west of Przemyśl, leaving the Russians in control of eastern Galicia, with its railways and cities. Przemyśl itself was invested on September 26.

After their victories in east Galicia, the Russians by the beginning of October had crossed the three eastern passes of the Carpathians, and had advanced some distance toward Cracow, the possession of which would have wrought serious harm to the Central Powers. But the news of the offensive now forming against western Poland put a stop to these plans, and they fell back to the San.

*First German Drive at Warsaw.*—If, as has been noted, it was the German expectation that the Austrians would hold the Russians in Poland, and thus leave Germany free to throw her full weight on France, the Galician campaign must have proved a rude awakening. In spite of Tannenberg, East Prussia had again been invaded, and in the south Cracow would be the next objective of the Russians. But if Poland could be attacked directly and its great fortresses captured, the Central Powers would be in a position to menace the flanks of the Russian armies, and by seizing their communications force them to withdraw. And at any rate it was time to do something to check the Russians, whose efficiency had been as greatly underestimated as their victories had been unexpected. Accordingly the Central Empires opened their first offensive against Warsaw (September 27) with Von Hindenburg (a few days later) in command of the Austro-German forces. Four separate armies advanced—one from Thorn up the Vistula, another from Kalisch towards Lodz, and a third from Breslau towards Novo-Radomsk, the fourth from Cracow towards

Kielce. These four armies numbered probably about 1,500,000 men, of whom two-thirds were Germans. The advance was rapid. On October 8 Lodz was occupied, by the 11th contact made with the Russians at Skierniewice. The southernmost army was on October 13 engaged in the neighborhood of Ivangorod. By the middle of the month the Germans were almost within siege-gun range of Warsaw. That city on the north was well protected by the Vistula and the Narew with their fortresses, but the Germans had turned, so to say, the position by advancing from the south and west. Apparently the Russians had not contemplated the possibility of the offensive now developing, and had made no adequate preparations to defend Warsaw. At any rate the northern army (Von Mackensen\*) greatly outnumbered the Russians available for its defense. In fact there were but few Russians in central Poland. We have then by the 9th of October the following situation: an army at the gates of Warsaw, two others to the west to face any eventuality, and a fourth covering Ivangorod. Warsaw apparently was doomed, and possibly with it the whole of Poland. Such troops as held Warsaw were having the worst of it. But on the 18th Russian reinforcements appeared, and increased on the succeeding days. They crossed the Vistula at Novogeorgievsk, and advanced upon the Germans, who on the 21st were in retreat. Before withdrawing, however, they resisted strongly, but their left was turned at Sochaczew. The Germans succeeded in crossing at Josefov, but were annihilated on the 21st. At Ivangorod the Russians crossed the river (October 20-22) to the western bank, attacked the Austrian right, and after several days' fighting forced their entire army to retreat to Radom, which place, with Lodz, was reoccupied. At Kielce the Austrians on November 3 were severely beaten. The main German armies, after heavy fighting around Rawa, Skierniewice, and Lowicz, continued their retreat, and early in November were once more across their own frontier.

*Second Offensive in Galicia.*—At the same time with the main offensive in Poland the Austrian forces in Galicia, composed in part of Auffenberg's original army and in part of German troops, resumed the offensive, before which the Russians had fallen back behind the San. On October 18 the passage was attempted by the Austrians but failed. There was more or less fighting throughout this region: Bukowina had been cleared of Austrians and Czernowitz captured. On November 4 the Russians had recrossed the San, and two days later completely defeated the Austrians.

The Russians resumed their offensive against Cracow. The cavalry advancing westward passed Kolo November 9, and next day crossed the frontier. This showed that the Germans had no idea of making any stand on the Warta. Hence the Cracow movement was coupled with a movement against the Warta, directed against

\* August von Mackensen, born (1849) at Haus Leipnitz, Saxony; served in the Franco-Prussian War; later studied at Halle; at various times attached to the general staff; colonel of the First Regiment of Hussar Body Guards (1894); raised to the nobility (1899); general of cavalry and general in command of the Seventeenth Army Corps (1908); wrote a history of the Hussar Body Guards and a military history; in European War received chief credit for directing the Austro-German drive which swept the Russians back from the Carpathians across the San and resulted in the recapture of Przemyśl and later in the fall of Lemberg; received Order Pour le Mérite for early victory (1914) at Lowicz.

the left of the Germans, and a general advance began. By November 12 the Uzsok, Lupkow, and Dukla passes were occupied, and by December 6 the Russians had got to within 12 miles of their goal.

On the 8th, however, they were compelled, after a battle under the walls of the place, to fall back, and on the 12th the Dukla was recaptured. This called for a fresh withdrawal to the Dunajec-Biala line, past Tarnow to Krosno. The Dukla-Lupkow pass was the next to fall to the Austrians (probably Germans), but now the Russians counterattacked, and succeeded in taking the Galician entrances of the western passes.

*Second Drive at Warsaw.*—It was partly to relieve this serious threat against Cracow that Von Hindenburg opened his second offensive against Warsaw. By November 15, he had driven the Russians towards Kutno, who on the 18th crossed their left over the Bzura from Lodz westward. On the 19th, Von Mackensen had broken the enemy's lines between Lodz and Strykov. Into this gap he drove two corps; with the Russian army cut in two, it looked as though a decisive success were at hand. But reinforcements coming up just in time, re-established the line; the two German corps, however, after a most desperate struggle, November 24-26, in which they suffered frightful losses, managed to break out to the north. The Russians on December 6 abandoned Lodz; on December there began a three weeks' battle for the possession of Warsaw. When it closed, Warsaw was still in Russian hands, whose line now followed the Bzura-Rawka River to the west of Kielce through Tarnow, joining the forces on the Dunajec. By taking up this position, Lowicz, Petrikov, Tomaszow, and other towns were abandoned to the Germans, but the line was better, and in war it is armies and not cities that count. The year closed with the repulse of German attacks upon this line of the rivers.

*Russian Campaigns; Przemyśl.*—In the winter of 1914-15, fighting continued over the whole front from the Baltic through Poland along the Carpathians to Bukowina. A serious assault on the Bzura-Rawka line, including the considerable battle of Borzynov, ended in a German check. In the north, the Russians had to fall back across the East Prussian frontier, losing Lyck (Feb. 7-20). They, however, repelled the German attempt to reach the Warsaw-Petrograd (St. Petersburg) railway. Ossowiec continued to distinguish itself by resisting a renewed German attempt to take it, and the offensive in this region closed with no special advantage to the Germans. On the Narew, they were beaten (Feb. 26) near Prasnysz, which they had captured on the 24th, thereby threatening Ostrolenka.

In the south a vigorous attempt was made to relieve Przemyśl. This involved the control of the Carpathian passes. One of these, Kirlibaba, was captured by the Russians, Jan. 17, 1915. They already had the crest of Dukla, controlled Lupkow and were in the foothills everywhere else. To turn them out, three Austrian armies attacked the positions. The left made little headway, but east of the Lupkow, all the passes were taken. At Koziowa, a battle lasted from February into March, in which the Austrian assaults were beaten off, thus saving Stryj and Lemberg, and preventing the relief of Przemyśl.

In Bukowina, the Austrians took Czernowitz, Kolomea, and Stanislaw, only to be driven out of this latter place, and compelled to fall back to the Kolomea-Czernowitz line. No relief therefore coming, Przemyśl, after a siege of seven months, fell on March 22, 1915. The Russians now renewed their attention to the passes; only by controlling them could they hope to invade Hungary, and whether they should attempt this or not, it was of the first importance to hold the passes in order to protect their flank against attacks coming from the south. As a result of their efforts, the Russians claimed (April 12-18) the capture of a considerable part of the principal chain. But these operations had little or no effect on the general situation, any more than the Russian capture of Memel (March 17), which they evacuated four days later. More serious was the German invasion of Courland; there was an affair at Shavli (April 29) and Libau was entered on May 8. The Germans had broken ground for severe efforts to be made later.

*Russian Defeat and Withdrawal.*—These and all other contemporaneous events in this theatre, however, pale into insignificance in comparison with the Austro-German offensive on the Dunajec line. Aroused by the unexpected success of the Russians so far, the Central Powers rose to the occasion, and by an application of their powers of organization prepared during the winter of 1914 and spring of 1915 for a campaign about the issue of which there was from the outset not a shadow of doubt.

At the end of April four German corps stood between the Middle Pilica and the junction of the Nida and the Vistula; on the west Galician front were at least 10 more corps, half German, half Austro-Hungarian, while the Carpathian front was held by 12. The leader of all these forces was General von Mackensen. Opposed to him the Russians had barely 14 corps, commanded by General Ivanoff, who had under him Dmitrieff and Brusiloff. The Austro-Germans for the approaching campaign had brought together a number of guns, and supplies of ammunition, more staggering to the imagination than their concentration of men. It is said that over 4000 guns were collected, of which over one-half exceeded 8 inches in calibre. The work of preparation, which perhaps is unique in military history, would perhaps have been impossible but for the admirable roads, both rail and ordinary, in the region to the south and west of the scene of the conflict. The campaign was planned by Erich von Falkenhayn.\*

The end now sought by the Central Powers was to crush the Russians so thoroughly that they should no longer be a factor in the war. As early as April 28, Mackensen had advanced against Gorlice. Three days later (May 1) the tremendous batteries opened, and continued for several hours on the 2d. It is said that in this time 700,000 rounds were fired. The Russian first line was powdered out of existence. The

\* Erich von Falkenhayn, born (1853) at Burg Belchau; entered the army in youth; military attaché to the Legation at Paris (1887); military instructor and favorite of the Crown Prince and Prince Eitel Friedrich (1889); chief of the general staff of the Ninth Army Corps (1898); served in China during Boxer Rebellion (1900); lieutenant general (1906); retired (1910), but became active again in the European War; Minister of War (1914), in which office he upheld the officers whose conduct in Alsace resulted in the Zabern disorders; succeeded Moltke as chief of the general staff (December, 1914), the youngest man ever to hold that office, and was made a general of infantry.

Austro-Germans crossed the Dunajec-Biala line at various points; once the front broken in, Von Mackensen advanced sending his right due east to reach Dukla Pass, hoping to catch the Russians in Hungary before they could make their retreat by it; his left and centre changed direction so as to face northeast. This manoeuvre forced the Russians to abandon Tarnow and widen the gap already made in their lines near Gorlice.

The campaign that followed the defeat of the Russians in the battle of Gorlice and their dislodgment from the lines of the Dunajec, of the Wisloka, and of the San, respectively, consisted in a pursuit by the Austro-Germans that resulted in a withdrawal from the passes, in the evacuation of Bukowina (June 12) and in the recapture of Jaroslav (May 15), Stryj (May 31), Przemysl (June 3), and of Lemberg (June 22). Galicia was cleared of Russians.

But as may be inferred from these dates, the Russians offered a stubborn resistance at every point and sometimes, as at Opatov (May 15-17) and at the crossings of the Dniester, even repulsed their pursuers. The fact is that, although defeated and driven back, they had not lost their cohesion as troops and were ready, whenever circumstances favored, to give a good account of themselves. We are compelled to believe that in this tremendous campaign the Russians were taken by surprise, that the magnitude of the attack was unexpected by them. It seems to be reasonably certain, moreover, that they lacked the guns and shells to reply effectively to the terrible Austro-German artillery.

*Entire Eastern Front.*—The operations for the fall of Przemysl and Lemberg must be regarded as the prelude of a general offensive on the entire Russian front from the Baltic to the frontier of Rumania. The immediate effect of the Galician campaign was to force the withdrawal of the Russians in this part of the tremendous theatre to a defensive position behind the Zlota Lipa and the upper Bug, which remained the line of separation in this region until August 27. On the side of the Central Powers it was necessary in this region to guard against any counter offensive originating in Volhynia and menacing the right of the forces that turned northward against the line Lublin-Kholm in the general offensive that now gathered headway. This new offensive as just stated extended over the whole eastern front, along a line over 1000 miles long, and opened in the middle of July. But already, on June 28, the advance had been begun against Lublin-Kholm. This advance received a check, however, July 1-7, in the severe defeat of the Austrians at Krasnik, a victory from which, save in the important element of time gained, the Russians derived no benefit. The German campaign had for its main object to bag the Russian armies. It is clear that the Russian situation was most serious. Four lines of railway formed their lines of communication, the Petrograd-Vilna-Warsaw, covered by the Niemen and Narew; two interior lines, Siedlee-Warsaw, and Brest-Litovsk-Ivangorod, without any natural defenses; and the Kovel-Kholm-Ivangorod line in the south. These four lines are interconnected by three others running approximately north and south. If these railways could be seized by the Austro-Germans before the Russians could withdraw by them, a material part of the Russian forces in Poland could be cut off and surrounded.

Pressure was applied everywhere, thus robbing the Russians of the advantage of their interior line; specifically the Vistula and the Narew and Lublin-Kholm lines were to be forced. In the north Von Bülow was to renew his attacks; if successful, the Petrograd-Vilna-Warsaw line would be cut. In the south the Austrians were to cross the Dniester and roll up Ivanoff's left wing.

A week after the opening of the campaign the Russians had abandoned the line of the Bzura; Von Gallwitz had crossed the Narew between Pultusk and Ostrolenka, where he was held by the stubborn resistance of the Russians. Further north, Mitau and Shavli were captured. In the south the Austrians failed in the Dniester region; the offensive against Lublin-Kholm, renewed July 15, was successful, the Russians suffering a defeat at Krasnostaw. But they offered so stout a resistance immediately afterward, that it was not until July 30 that Lublin was reached.

*Campaigns around Warsaw.*—But the Austro-Germans were too strong for the Russians, who had managed, west of Warsaw, to hold the Blonie lines as late as July 26. On the 30th, however, the Germans crossed the Vistula, 20 miles north of Ivangorod. This fortress fell on August 4, and Warsaw was evacuated on the 5th. Novogeorgievsk, however, was not evacuated, as it was thought capable of delaying the German advance. It fell, however, under the fire of Von Beseler's guns on August 19. The necessity of abandoning Warsaw had been foreseen, and preparations made for withdrawal. Part of the forces retreated to the Narew, and part joined the forces on the south. This was the opportunity for the Austro-Germans. Could the forces pressing south and north from the Narew and Lublin-Kholm, respectively, join hands in the Siedlee-Lukow region, a lasting victory would have been achieved. But the Russians offered an extremely stiff resistance between the Narew and the Bug. They held so strongly on the Vyshkoff-Ostroff line that the Germans shifted their efforts to the northeastward between Ostrolenka and Vilna. Here they did break through on August 9 and on the 10th captured the fortress of Lomza. But even after this success their advance was slow; and in the meantime the Russians had succeeded in escaping. In the south an equally stiff resistance was offered. Here in the neighborhood of Lubartoff a serious battle was fought August 6-9; although a Russian defeat, it gained time for the withdrawal of the last forces further north and west.

The attempt made against Riga August 9 to September 8 came to nought, but on August 17 Kovno was taken and the line of the Niemen thus broken. The effect of this German victory was the abandonment of Brest-Litovsk and a withdrawal along the whole front from Ossowiec (abandoned Aug. 22) to Vladimir Volynski. Grodno was evacuated September 1-2. In the south, Kovel was (Aug. 23) entered by the Austro-Germans, and the Russians were compelled to evacuate their line of the Zlota-Lipa and the upper Bug. Pinsk was occupied.

Thus, four weeks after the fall of Warsaw, the Central Powers were in full possession of the entire line Niemen-Bug. They had failed to capture the Russian army, but Poland had fallen into their hands with its fortresses. They now directed their attention to the capture of the

railway running from Vilna to Rovno across the Pripet Marshes. East of this railway lies a vast stretch of marshland not traversed by any other north and south line; if this road could be taken from the Russians, the Austro-Germans would have a line of communication between their northern and southern theatres of operation, while the Russians would find their own forces cut in two by the marshes. The operations of the Germans north of the marshes were successful. On September 19, the evacuation of Vilna was ordered. In the south, on August 27, the Austro-Germans had renewed their offensive. The Russians withdrew into Volhynia, were beaten at and lost Lutsk, and forced to cross the Styr. Dubno was entered on the 7th. But on the 8th the Russians struck back, inflicting a defeat on the Austro-Germans at Tarnopol and again at Tremblowa. On the 23d they succeeded in recapturing Lutsk.

*Baltic Campaign.*—As may be imagined, the fall of Vilna did not end the Austro-German offensive. Once in possession of it, the Germans advanced eastward, sending five cavalry divisions towards Polotsk. Detachments of cavalry were also sent out against the Molodetchno-Polotsk railway, while strong forces were converging on Minsk. Just north of the Pripet Marshes another force undertook an enveloping movement against the line Minsk-Bobruinsk; that is, a movement over a front of 150 miles was initiated, partly to cut off, if possible, the retreating Russians, and partly to confirm the German hold on the Riga-Dvinsk-Vilna line. Contact was made in the region around Vileika. After several days' fighting the Russians managed to straighten their front, and even took the offensive. They cleared the Polotsk line, held on around Vileika and Molodetchno, and further south succeeded in checking the German advance. It is possible that the need of troops in Serbia and on the western front may explain the German failure to continue the offensive.

In the meantime an important attack was being made on Dvinsk. On September 24 a battle was fought between the Dvina and Lake Drisviaty, 20 miles south of Dvinsk, in which the Germans made no gains of any consequence. Later, October 4-18, they concentrated their efforts between Illukst, 15 miles northwest of the city, and Lake Sventen, five or six miles due west. There was severe fighting in this region, but with no particular advantage to the Germans until October 25, when they captured Illukst, and a day or two later made other advances. But these gains were more than neutralized by the Russian counteroffensive, which opened October 31, between Lake Sventen and Ilscn (battle of Platokovna, a village between the lakes), and resulted in a German defeat. The Russians followed up this victory by further advances to the north and northwest of Illukst, and towards that place itself. By the end of November, fighting ceased in this particular sector.

*Riga.*—The Germans were no more successful in front of Riga. This city, on the right bank of the Dvina, is protected on the southwest by the Tirul swamp, crossed by the railway and road from Mitau through Olai, which constitutes from this direction the only possible approach. The German lines about mid-October ran south from the sea along the river Aa to Mitau, and thence curved eastward to Friedrichstadt and Jacobstadt on the Dvina, halfway between Riga and Dvinsk. Three possible lines of attack

existed—the Tukkum-Riga railway between Lake Babit (west of Riga) and the sea; the Mitau-Olai line; and one from the southeast, from an island (Dalen) in the river. On October 14 the Germans opened, and managed by October 20 to reach the river at Borkowitz, 20 miles up. But they failed to cross the river in spite of all their efforts. Their centre in the meantime had got to Olai, but could go no farther. During the first half of November they tried the first line mentioned above, but on the 10th the Russians, assisted by their fleet, beat them back, and later pushed on beyond Kemmern. These attempts to take Riga proved a failure.

In the beginning of December, 1915, the Germans captured the Borsemdünde position on the Dvina, but at Dvinsk continued to lose ground about Lake Sventen and at Illukst. On the other hand they beat off with great loss an attack on Postavy, 50 miles south of Dvinsk.

During the last ten days of March the Russians developed without effect an offensive against the bridgehead at Jacobstadt and the railroad thence to Mitau. Similarly south of Dvinsk they were defeated near Lake Narocz, where their objective was Sventziany, on the Vilna-Dvinsk railroad.

*Southern Sector.*—We must now turn south to see what was happening in that region. Three days after taking Lutsk (September 23) the Russians abandoned it, and took up a position to the east extending from Rafalovka through Czartorysk and Kolki to a point south of Dubno. Rovno was behind them. The first attempt to converge on that place failed. Von Linsingen then early in October advanced against Sarny, where the Kovel-Kiev railway crosses the Vilna-Rovno line. The capture of Sarny would have meant the loss to the Russians of this latter railway. During the next two months Von Linsingen and Brusiloff were at grips on the middle Styr.

Along the line of the Styr River the struggle continued for the control of the left bank. At the end of the month the Russians took the offensive on the Bessarabian frontier, and advanced along two main lines—first, the Odessa-Czernowitz-Lemberg railroad; second, farther north, the Kiev-Kovel-Warsaw line. In the first region their efforts, centred on the capture of the Bukowinan capital, which had already changed hands five times in the course of the war, met with failure.

In the region of the Styr River, however, they had better fortune. Early in January they succeeded in crossing this line north of the Kovel-Sarny railroad, and in holding on to their position. Thereupon the village of Czartorysk became a storm centre, and was finally captured by the Russians by assault.

Early in February, 1916, they achieved some gain in the Lutsk-Rovno-Dubno sector; the Germans were reported as standing on the defensive along the Pruth, the Dniester, and the Sereth. Further Russian advances also were reported, the most important being the capture of Uscieczko, on the Dniester, thus again threatening Czernowitz.

In April, 1916, Brusiloff succeeded Ivanoff in command of the armies from the Pripet Marshes to Rumania, and began preparations for a general offensive on this line. Heavily fortified as it was, the Austrians had believed it to be so strong that they had transferred many of its defenders to other fronts.

The Russians opened northwest from Rovno

through Lutsk towards Kovel; west along the Rovno-Lemberg railway towards Dubno; northwest from Tarnopol towards Lemberg; and south across the Pruth against Czernowitz. Great success attended the effort. Lutsk, abandoned by the Austrians, fell on June 6; Dubno on June 10, with 35,000 prisoners and 30 guns as additional prize; farther south on the same day Buczac and Potok Zloty were entered and many more prisoners taken. But now the resistance of the Central Powers stiffened from Tarnopol to Kolki, and the Russian advance was checked, giving way to obstinate fighting by both sides. It is believed that the Germans came to the Austrian rescue on this portion of the front. Beaten at Dobronobtz (18,000 prisoners, 10 guns), the Austrians, June 17, abandoned Czernowitz. The effect of its fall was greatly to imperil Pflanzer's army. A small part of this army was pushed over the frontier into Rumania and interned; the main body, cut off from communication with Lemberg by the capture of Kolomea and the threat against Stanislau, was crowded against the flanks of the Carpathians.

In this great movement of the Russians the significant thing was the loss of the Austrians in prisoners (250,000) and in killed, wounded, and missing (unknown), an irreparable loss. Hungary alone admitted a loss of 600,000 men in this campaign. In ground gained, the Russians had recovered about 15,000 square miles of territory. By the middle of July (1916) the Russians were still some miles from the railroad centre of Kovel; and in their progress towards Lemberg, had reached the Zlota Lipa River.

The situation on the eastern front became so serious that the German General Staff determined to reinforce the weakened Austrians with German troops. Consequently, General von Linsingen was sent at the head of 200,000 men. These were sent against the Russians west and northwest of Lutsk. Their presence was immediately felt, inasmuch as they won important successes at Kiselin and Lokatchi. Many Russian prisoners fell into their hands. The Russian offensive was checked effectively for the time being at the Stokhod River. The advance on Lemberg was also stopped at the Galician frontier at Brody.

The advance in the south nevertheless went on almost as rapidly as before. After the capture of Czernowitz the Russians again overran the Bukowina. They proceeded down the railroad to Radautz, cut off the retreating Austrians and took over 1000 prisoners. West of Czernowitz the opposition was stiffer but on July 1, the important railroad junction at Kolomea was captured and a little later the railroad running from Lemberg into Hungary was cut at Delaytyn. This seriously threatened the Austrians in the north. New gains were now made in the Kovel sector. They crossed the Stokhod River at Ulgi by means of pontoon bridges and made another great thrust at Kovel in the face of extremely heavy resistance by Von Linsingen. On July 16 they captured 30 guns and 13,000 prisoners at the battle of Svinusky. On the 28th, they captured Brody and advanced upon Lemberg. Lemberg was now threatened on three sides and was in serious danger of being enveloped.

The Russians now seemed to concentrate all their efforts to capture this stronghold. They advanced from Dubno and Tarnopol on the north and from Stanislau on the south. They captured this latter place with very little effort.

In the Carpathians the Russians also continued their successes, by capturing Jablonica.

South of Brody the Russians captured an entire ridge held by the Teutonic forces on the 5th and 6th of August. The ridge contained six villages. More than 5000 prisoners were taken. On the 8th 8500 more prisoners were taken in eastern Galicia. The Central Allies continued to retreat in this region as the Russians continued to gain on the Sereth and Zlota Lipa rivers. On the 14th the town of Tustobaby, a strongly fortified point was taken. This put the Russians several miles west of General Bothmer's front and menaced his flank and rear. So serious was his position that he was compelled to abandon the Strypa River line. Immediately upon the fall of this line General Letchitsky struck on both sides of the Dniester. He drove the Austrians out of the Jablonica Pass and thus opened up the way to Kutly.

During September the Russians were able to make little progress toward Lemberg. They were checked at Halicz and were not able to advance on the Kovel-Vladimir-Volynsky line. Heavy fighting occurred at Brzezany and very heavy assaults were made further south. The results of these were the abandonment by the Germans of the entire Strypa and Zlota Lipa river lines. Now the only natural boundary between the Russians and Lemberg was the Gnila Lipa River. All attempts to take Halicz, however, failed and a strong German counter offensive compelled the Russians to give up much of the newly captured territory. They also lost about 5000 men in prisoners.

In October the Russians renewed their assaults in the general direction of Lemberg. On October 4 the Zlota Lipa was crossed after a severe three days' battle south of Brzezany. North of Lemberg intense fighting occurred along the Brody-Lemberg railroad. Along the Stokhod the Russians merely kept on the defensive in order to keep the Teutonic allies from starting an offensive movement. The latter, nevertheless attempted to relieve the pressure on Lemberg by beginning an offensive movement in the Carpathian Mountains. This extended from the Rumanian border to the Jablonica Pass, a front of 75 miles. The Russians immediately gave way in the Negra valley.

West of Lutsk the Russians made some gains south of the Stokhod along the Luga River. This enabled them seriously to menace the city of Vladimir Volynsky which controlled the southern entrance to Kovel. The beginning of the severe Russian winter now seemed to put an end to the Russian forward movements and the Teutons took the opportunity to strengthen their lines. Their weakest point was along the Stokhod. They advanced here as well as on the Navayuvke, which flows near Halicz. On November 9 an extremely heavy attack was made on Russian positions at Bkrobowa in Volhynia. The Russians, after savage resistance were compelled to fall back to their second line of trenches. Another German blow at Dorna Watra also was successful and compelled the Russians to relinquish newly won positions. In this latter engagement they lost over 4000 prisoners. As a result of the taking of a bridgehead on the Stokhod the German hold on Halicz was considerably strengthened.

In December, 1916, and January, 1917, the entire eastern front was practically quiet. The Germans contented themselves with small sorties

and trench raids in order to protect their positions in Volyhnia. The chief Russian activities during these months were in the south where they attempted to relieve the tremendous pressure being exerted on Rumania. Their aim was to threaten Von Falkenhayn's rear by crossing the mountains and securing the railroads which were the arteries which fed his troops. The main point of attack through the Trotus valley was unsuccessful, and by the middle of December was abandoned.

In order to relieve the great Teutonic pressure on Rumania, the Russians began an offensive in the Riga sector during the first week of January, 1917. They attacked the German lines in the Lake Babit region west of Riga and advanced more than a mile, capturing a fortified position between the Tirul swamp and the Aa River. Heavy fighting, usually successful to the Russians, occurred along the Dwina and south of Dwinsk as well as in the neighborhood of Vilna. These gains were held in the face of strong German counter attacks.

During the third week of January the Russian offensive appeared to have broken down. They were compelled to release their hold on the newly won ground between the Tirul swamp and the Aa. On the 25th the Germans attacked on both banks of the Aa and captured several fortified positions along with 2000 prisoners. Strong Russian counter attacks failed and towards the last part of the month they were driven back an additional two-thirds of a mile. For the participation of the Russians in the Rumanian campaign see *SOUTHERN THEATRE, Rumania*.

*Russian Revolution.*—On March 9, 1917, began one of the greatest events in world history. That was the Russian revolution. Its immediate cause was the inefficient handling of food supplies in Petrograd. Its remote cause was the growth of a democratic Russia, which could no longer be controlled by the Czar and his bureaucratic, pro-German government. A vast majority of the Russian people who felt that the overthrow of the Czar would be a hard task were agreeably surprised at the ease with which it was consummated.

The first institution attacked was the cabinet. The revolutionary army rushed into the administrative buildings and arrested or executed the former premier, Stürmer, a Germanophile, Protopoff, the Minister of Interior, Golitzin, the premier, Rittich, the Minister of Agriculture and many other conservative bureaucrats. The Duma immediately took control of the government and appointed a Committee of Safety, headed by Michael Rodzianko, President of the Duma. A delegation was immediately sent to the Czar demanding his resignation. The Czar abdicated, giving the throne to his brother, Michael Alexandrovitch. Another delegation was sent to Michael which compelled him to give up his claim to the throne. Democratic rule in Petrograd immediately began to destroy all traces of the Romanoff dynasty. The Secret Service, most detestable to the Russians, was abolished. The fortress of St. Peter and St. Paul, comparable to the Bastille, was captured, and all the political prisoners released. The Winter Palace, scene of Bloody Sunday in 1905 (see *RUSSIA, History*), was taken over as a meeting place for the Duma. Even the orthodox church, which was a stronghold of Czarism, came over to the side of the revolutionists. This event was of almost as great importance as the overthrow of the Czar himself.

The Committee of Safety set the new government in motion by appointing a cabinet. It was composed of the best men in Russia. Prince George Lvoff was made Premier. He was of royalist descent and a man of untiring energy, great business experience and a thorough democrat. The Minister of Foreign Affairs was Paul Miliukoff (see *MILYUKOV, PAVEL*), who was chiefly responsible for the overthrow of the Stürmer ministry. The Minister of War and Navy was Alexander Guchkoff, Minister of Agriculture, Shingareff, Minister of Justice, Kerensky, who was to play a prominent part in the later history of the revolution, Minister of Education, Manuiloff, Minister of Communications, Nekrasoff, Minister of Trade, Konovaloff and Controller of the State, Godneff. Roditcheff, a strong advocate of the rights of free nationalities, was appointed Governor-General of Finland. The Jews were given political and religious freedom. The leaders of the Zemstvos (see *RUSSIA, Government*) were ordered to take over the governorship of the provinces.

The first country to recognize the provisional government was the United States, which sent a message of recognition through Ambassador Frances on March 22. Great Britain, France and Italy did likewise the next day. The new government was put in a smooth running order in a week. Internal abuses were done away with and the work of reorganizing the army was undertaken. Grand Duke Nicholas (q.v.) was removed as Commander-in-Chief and General M. V. Alexieff was appointed his successor.

Events moved rapidly throughout all the Russias during the next few weeks. Czar Nicholas was imprisoned in Tsarskoe Selo, but was later removed to Tobolsk. An excess war profits tax was levied on all war industries. All the imperial lands and monasteries were confiscated. In the cities a mania for organization raged. Trade unions sprang up and the 8-hour working day appeared in almost all the cities. Even the peasants organized a council of peasants' deputies. One hundred thousand exiles made a triumphant journey across Russia from Siberia. Premier Lvoff stated on April 10th, "The object of independent Russia is a permanent peace based on the right of all nations to determine their own destiny." Kerensky stated that if the German people would throw off the yoke of autocracy, the provisional government would offer preliminary peace negotiations.

Despite the celerity and thoroughness with which the provisional government took over the reins of authority, there were signs of unrest throughout the country. A party of Russian radicals under the leadership of Lenine was allowed to pass through Germany from Switzerland to attend a Socialist conference at Stockholm. Another disturbing element was the Council of Workmen's and Soldiers' Delegates. This body, whose name is self-explanatory, passed a resolution of April 16, stating that it was necessary for it to exercise influence and control over the provisional government and called upon the people to back it up as the only body able to put down any reactionary movement. They took military matters into their own hands and arrested several conservative officers.

In the first two weeks of May a decided breach appeared between the government and the Council. It occurred over the war aims of the new government. After a series of radical outbreaks headed by Lenine, the Council demanded that the

government assert its aims. This was done when a note signed by Miliukoff was sent to the Allied countries to the effect that Russia pledged herself against a separate peace and asked for a cordial renewal of bonds between Russia and the Allies. The members of the Council vigorously protested against this stand and stated that they would compel the government to accept their views or else resign. Hostile demonstrations occurred in the street of Petrograd. Parleying between the Council and the government went on for several days which resulted in the weakening of the latter. General Korniloff and Minister of War Guchkoff resigned because the Council practically took all power from their hands. Appeals to the patriotism of the soldiers and workmen were of no avail.

On May 15, the Council suddenly determined to accept a suggestion offered by Kerensky sometime previously, to form a coalition government. This decision was issued in the form of a manifesto and also declared against a separate peace and fraternizing between German and Russian soldiers. Peace was to be brought about by an appeal to the socialists of Austria and Germany to overthrow autocracy.

Foreign Minister Miliukoff resigned on May 16 because of a dispute in the government over the question of coalition. Thereupon the cabinet was entirely reorganized. Tereshtenko replaced Miliukoff and Kerensky became Minister of War. Kerensky was a Social Revolutionist and one of the most popular men in Russia. The day before the coalition cabinet was formed, President Wilson announced the personnel of a special mission (headed by Elihu Root), which was to go to Russia to counteract German influences favoring a separate peace. He also announced the sending of a railroad commission which was to aid in the reconstruction of Russian railroads.

The reorganized cabinet declared that it stood for a general peace only and that it favored no annexations and no indemnities. Within a week internal dissension caused a partial downfall of the cabinet. Strikes caused by the exorbitant demands of the laborers occurred daily throughout Russia. The Kronstadt Committee of the Council of Workmen's and Soldiers' Delegates declared their independence of the Provisional Government, and General Alexieff resigned as Commander-in-Chief of the army. He was succeeded by General Brusiloff. The outstanding figure in the Revolution now was the Minister of War, Kerensky. It was only his eloquence and patriotism that held in abeyance the complete collapse of the economic and military forces of the government. Backed by the All-Russian Council of Peasant Deputies, which voted against a separate peace, and for a vigorous prosecution of the war, he introduced strong disciplinary methods into the army.

The attention of the country and government was now given to the internal political situation. On June 8, a meeting was held by the commercial, industrial and banking institutions. This body declared against a separate peace. On June 12, a committee of the Duma composed of 61 members met to plan for a meeting of a Constituent Assembly, which was to draft a permanent constitution for Russia and to solve internal economic, industrial and racial problems. Both men and women were to be allowed to vote for the deputies. Changes were made by the government whereby the cantons and communes, which heretofore had no local self-government, were to

be governed by peasant administrators elected by universal suffrage. A law was also promulgated which gave Finland complete internal autonomy. All anti-Jewish laws were repealed.

On July 17, there occurred serious riots in Petrograd between the Radical Socialist element under Lenine and government forces. The purposes of these anarchistic demonstrations was to overthrow the provisional government and to recall the armies from the fronts. After four days of heavy fighting in the streets the rioters were dispersed and their leaders ordered arrested. Lenine escaped. Another situation which caused five cabinet members to resign was the Ukrainian problem. The Ukrainian party demanded autonomy for the region in southwest Russia and part of Galicia. It was their demand that autonomy be granted immediately that caused the five Constitutional Democrats to resign from the cabinet.

On July 20, Lvoff, the Prime Minister, resigned. Kerensky was appointed head of the cabinet and also kept the portfolio of War and Munitions. He was made a virtual dictator with unlimited power. He later became the President of the Russian Republic. His government was backed up by the Joint Council of Workmen's and Soldiers' Council and of the All-Russia Council of Peasant Delegates. Kerensky immediately ordered all deserters to be shot and all revolutionary agitators to be arrested wherever found. General Brusiloff resigned on August 2 and was succeeded by General Korniloff. The radical disturbances and the spreading of anti-war propaganda had completely demoralized the army, with the result that they retreated everywhere on the Galician front.

Owing to the serious condition of the entire country, Premier Kerensky called together an "Extraordinary National Council" to meet at Moscow on Aug. 26, 1917. He determined not to wait for the meeting of the Constituent Assembly. The conference was composed of 2500 men representing practically all the parties in Russia. The internal conditions of the country were outlined by members of the cabinet, and the condition of the army was outlined by Generalissimo Korniloff. The conference had the authority to take direct action, but it clearly showed the division of the country. On the one hand was the socialistic element represented by Kerensky, and on the other hand the conservative bourgeoisie element represented by the commanders of the armies and the constitutional democrats. The radical Bolshevik element, which was to play a commanding part later, was not very strongly represented because of repressive measures taken by the government. Almost contemporaneously with the Moscow conference came the announcement on September 3 of the fall of Riga (see below). The effect on Russia was tremendous. Monarchist plots were discovered, and Petrograd feared that the German army would advance on the capital. The government was severely criticized for the lack of discipline in the army.

The crisis came on September 9, when General Korniloff revolted against the provisional government. A representative of the Duma called on Kerensky and demanded that he turn all the powers of the government over to General Korniloff. Kerensky refused outright and then moved with characteristic dispatch and resolution. He deposed Korniloff, arrested his envoy, declared Petrograd and Moscow in a state of siege and asked for and received the combined backing of





# BALKAN PENINSULA

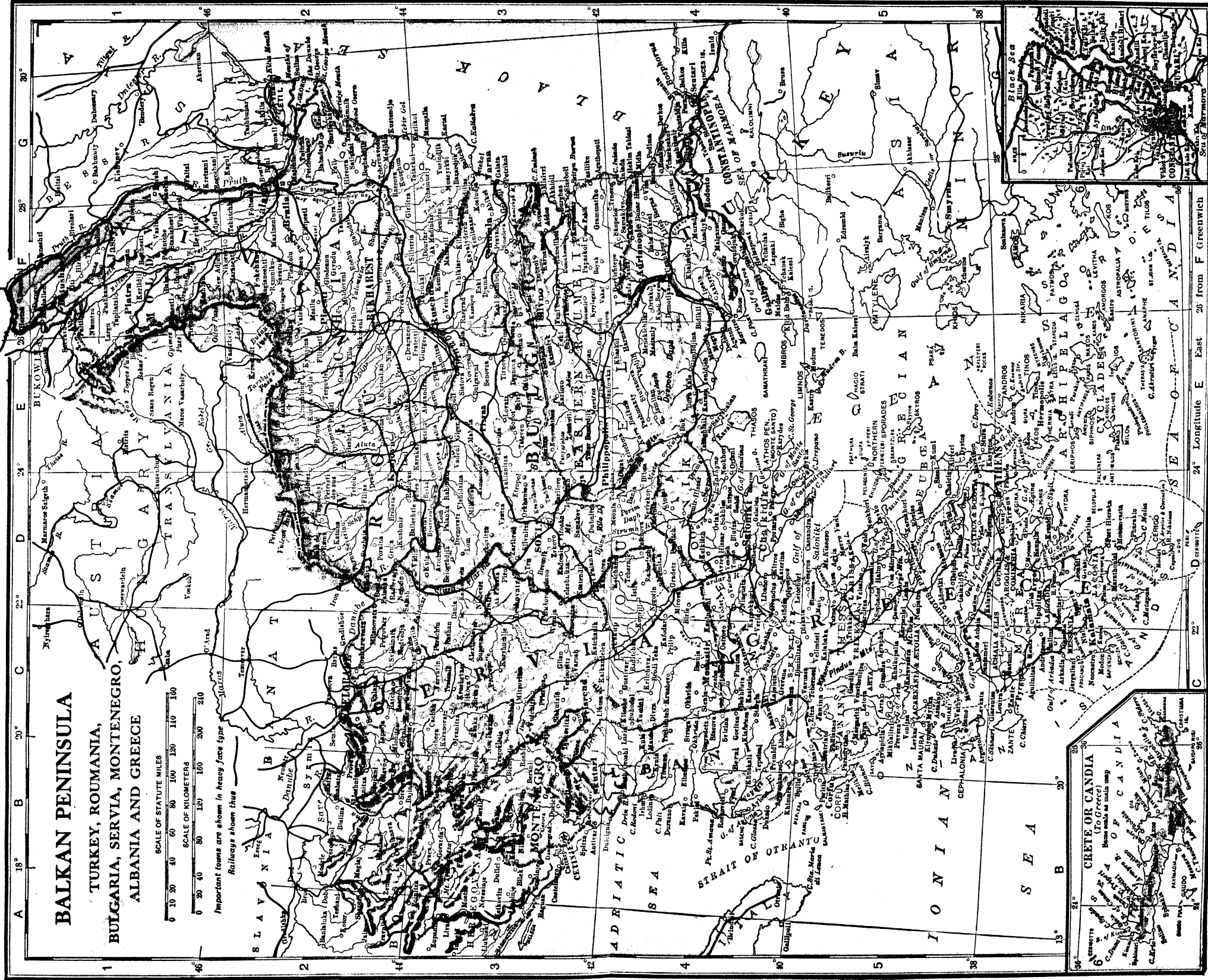
TURKEY, ROUMANIA,  
BULGARIA, SERBIA, MONTENEGRO,  
ALBANIA AND GREECE

SCALE OF STATUTE MILES  
0 10 20 40 60 80 100 120 140 160

SCALE OF KILOMETERS  
0 20 40 60 80 100 120 140 160 180 200 220

Important towns are shown in heavy face type

Railways shown thus



24° Longitude E East 26° from F Greenwich



the Council of Soldiers and Workmen and the Peasants Council. Kerensky himself became the Commander-in-Chief of the army and advanced to meet the army Korniloff was leading against Petrograd. It had advanced to 30 miles of Petrograd when the entire revolt collapsed, chiefly through the winning over to the government's side of General Alexieff, who had at first favored the revolution.

On Sept. 27, 1917, there assembled at Moscow a Democratic Congress, called into being by the Workmen's and Soldiers' Central Council. It consisted of 1200 members from all over Russia and was under the control of the ultra-radicals or Bolsheviki (majority). The congress provided for a parliament which was to have a consultative function. Kerensky, who organized a new coalition cabinet without consulting the congress, accepted the idea of the parliament, which was to be called the Temporary Council of the Russian Republic. The parliament had the right to interpellate the government, but the latter was in no way responsible to the former. This body was to exist until the Constituent Assembly met in December, 1917.

Late in October, the Bolsheviki leaders stated in no uncertain tones that Kerensky's government had lost the confidence of the real revolutionary party of the country and that it soon would be replaced by them. On November 1, Kerensky gave a statement to the Associated Press, which showed that he had practically given up all hope of restoring civil order in Russia and that urgent help was needed from the Allies if Russia was to continue the war. This was his last official utterance to the public. The Bolsheviki seized the reins of government on November 7, and dismissed the Preliminary Parliament. The guiding spirit was the Revolutionary Military Committee of the Council of Workmen's and Soldiers' Delegates. Trotsky and Lenine, the two Maximalist leaders, spoke before the Council, and the latter stated the problems before Russia. They were, first, immediate conclusion of the war; second, the handing over of the land to the peasants; and third, the settlement of the economic crisis. On November 9, a new cabinet was formed by the Council, in which Nikolai Lenine was Premier and Leon Trotsky Secretary of Foreign Affairs. Kerensky escaped from Petrograd but the rest of his cabinet was arrested. The former premier and a few thousand troops marched on Petrograd, but were defeated by the Bolsheviki. The Provisional Government was overthrown in Moscow and everywhere else the Bolsheviki were victorious.

Chaos and civil war now reigned supreme in Russia. Ukraine again proclaimed its independence, as did Finland. General Kaledines, leader of the Cossacks, with the aid of General Korniloff, declared war against the Bolsheviki, with the avowed purpose of saving the country. Americans and other foreigners took the first opportunity to get out of the country. The Bolsheviki passed a resolution asking for an immediate peace, stating that all belligerent governments should enter into negotiations for democratic and equitable peace. General Dukhonin, who commanded the armies, was ordered to offer an armistice. He refused, and as a result was dismissed. He was succeeded by Ensign N. Krylenko, who was given the title Commander-in-Chief of the People's Commissaries of War. Trotsky, in a statement issued on November 22, said that the Bolsheviki stood for a universal and not for a separate peace. The demobilization of the older

classes of the Russian army was begun. Secret treaties signed by former Russian ministers and foreign countries concerning the war aims of the Allies were published and created a profound impression.

Representatives sent within the German lines were cordially received, and arrangements were made to conduct negotiations for an armistice. Von Hertling, the German Chancellor, told the Reichstag (Nov. 29) that negotiations would be opened with accredited representatives of the Russian government and that he was ready to discuss debatable questions immediately. On December 3, the German government announced that an armistice prevailed from Pripet to south of the Lipa River, and that arrangements were being made to extend them over the entire front. Germany, Austria, Bulgaria and Rumania were represented at the negotiations. On December 8, Trotsky announced that they had been suspended for a week to permit all the belligerents to be informed that they were going on. On December 14, the armistice was finally signed at Brest-Litovsk. It was to be in effect 28 days and could be automatically extended. Another provision provided that peace negotiations were to be entered upon immediately, and consequently by January, 1918, they were in full swing.

While these negotiations were going on, Russian internal affairs were in chaos, and it seemed as though Germany was very anxious to make a peace before the Bolsheviki lost power. None of the Allied countries had recognized the Lenine government, and even the neutrals refused to do so. Continual uprisings occurred. The Cossacks and Ukrainians united against the Bolsheviki, Siberia proclaimed its independence, and even Kerensky raised another force to restore him to power. The much heralded Constituent Assembly met in December, 1917, and was practically shorn of all power because of lack of harmony and equal division of parties. The Bolsheviki did not have the overwhelming majority in it that they expected.

*Operations of the Russian Armies under the Revolution.*—After the breakdown of the Russian offensive on the Aa River at the beginning of 1917, the Russian front was comparatively quiet until the Russian revolution was well under way. The situation on the entire front was deplorable. Discipline had completely broken down. Generals were appointed and removed or they resigned. The orders issued by the officers had to be approved by the men themselves. Fraternization between the Russian and German soldiers was carried on to a large extent and could not be checked. The situation could not have been much worse. As a result of this demoralization the Germans and Austrians were able to remove several divisions from the Russian front for use on other fronts. What fighting was done was spasmodic and of a local character.

When Kerensky came into supreme power in Russia he reestablished military discipline in the army and inspired the officers and men with a strong anti-German spirit. The result of Kerensky's efforts was the beginning of a strong offensive from Brzezany to Zloczow on the upper stretches of the Zlota Lipa River. The objective was the capture of Lemberg. Brusiloff's army surprised the world with their vigor of assault and their seemingly limitless supply of ammunition. Brusiloff made fruitless attempts to break through at Brzezany and Zloczow and then suddenly shifted his attack south of the Dniester, in

the neighborhood of Stanislaw, where the Austrian and German lines met. The weight of the onslaught broke the Austrian line and the Russian forces pushed through and crossed the Lukwa and Lomnica rivers. They then occupied Kalucz, which had been the Austrian Army headquarters. This town was on the Lemberg-Stanislaw railway. Then the town of Halicz was taken by storm. So far 50,000 prisoners and vast quantities of war material had been taken. A wedge 20 miles long and 10 miles deep had been driven into the Austro-German line.

This drive turned out to be of no avail. Various sections of the Russian army mutinied with the result that the entire army was compelled to retire all along the front. On July 19, the Germans began a countermovement and penetrated the Russian positions on a wide front near Zloczow. Russian trenches near Brzezany were occupied on the next day, owing to the mutiny of the extreme socialist troops. The whole line in Galicia now began to retire. The Germans and Austrians occupied Tarnopol, Stanislaw, Nadworna, Czernowitz, Kolomea and drove the Russians across their own border out of Galicia. Spasmodic attempts to take the offensive in the north to relieve the pressure in the south were frustrated by mutiny among the troops.

*Fall of Riga.*—The month of September saw the capture by the Germans of the important city of Riga. Its fall was chiefly due to the superiority of German artillery and the defection of the Russian troops. On August 22, the Germans began to advance from Kemmern, between the Baltic and the Aa, and bombarded the Russian positions north of Dvinsk on the right bank of the Dvina River. On Sept. 2, they crossed the river at Uxkul, 16 miles southeast of Riga. The same day outposts entered the city and General Letchitzky withdrew to a prepared line east of the city. The Germans continued their attacks and took Jacobstadt, and penetrated 6 miles on a 26-mile front. The Russians attacked heavily but unsuccessfully. The Germans, in November and December, 1917, withdrew from most of the area captured after the fall of Riga and sent the troops to aid the Austrians in a grand offensive against Italy (see below).

From the military point of view the capture of Riga was of no importance without the occupation of islands which controlled the mouth of the Gulf of Riga. In October the Germans set out to accomplish this purpose. On October 13, forces were landed under the protection of warships on a northern inlet of Oesel Island. By October 15, the chief city of the island, Orensburg, was in their hands. The Russian battleship, *Slava*, 13,516 tons, and several smaller units, were lost in the defence of the Gulf. A landing was also made on Dagö Island, and the Russian garrisons of both islands were compelled to flee to the mainland to the eastward. The Russian Baltic fleet was locked up by the superior German fleet (50 warships) in Moon Sound. The Germans completely occupied the three islands, — Oesel, Dagö, and Moon, — and on October 21, effected a landing on the mainland at Werder, but later withdrew. In the meantime the Russian fleet escaped after inflicting unknown losses on the German fleet. Events on the Italian front prevented a combined land and sea attack on Reval and the coast of Finland.

IV. *Southern Theatre. A. Campaigns against Serbia.*—The campaigns against Serbia have two

main stages: (1) Austrian campaign across the Drina (August–December, 1914), which failed owing to demands in the Russian field; (2) Austro-German-Bulgar invasion of Serbia, to open the road to Constantinople. This campaign ended in the conquest of Serbia and Montenegro (October–December, 1915).

The military strategy of this campaign develops on three fronts: (a) the Germans crossed the Danube and took the line of the Morava valley; (b) the Austrians crossed the Drina and moved up the Lim; (c) the Bulgars, sending one army to beat off Allied reinforcements from Greece, moved on Nish with another army. The Serb army was driven to the sea through Albania.

*B. Italian Campaign.*—Italy's entrance into the war in May, 1915, relieving Russia, has two main movements: (1) to the north, to close the passes of the Alps against invasion; (2) to the northeast, to cross the Isonzo and take Trieste.

The Isonzo line was reached, but the operation was not completed. An Austrian invasion from the north (May, 1916) was checked mainly by an opportune Russian drive into Galicia.

The work before the Italians was therefore simple in respect of conception, difficult in point of execution. The configuration of the frontier at once fixed the nature of the task. It was absolutely essential to close the passes of the Alps from Switzerland eastward, in order to protect the flank and rear of their armies on the Isonzo line, and to prevent invasion of Italy. This condition secured, the task of the remainder of the forces was to cross the Isonzo, for it must not be forgotten that Italy's material objective was Trieste with the Istrian Peninsula.

Four armies took the field, two on each frontier, the northern and eastern. A fifth force, composed of Bersaglieri and Alpini, was designated for operations in the Carnic Alps. Gen. Count Luigi Cadorna,\* the chief of the general staff, was in general command. On May 24 the frontier of the Trentino was crossed. Two weeks later the Italians were well advanced in the Trentino and Tirol; the road to Verona was closed. It would seem that the Austrians during the opening days of the campaign in this region had opposed but slight resistance to the forward movement of the Italians. Further east a more severe struggle took place for the possession of the passes of the Carnic Alps. Here the Italians took the Plöcken Pass and gradually extended their hold upon the peaks to its east and west, thus closing the gateways opening southward into the valley of the Tagliamento. The struggle continued in the mountains during the entire summer, and took place chiefly at high altitudes. In the Trentino as a whole the Italians managed to get control of most of the roads leading into their country. West of Lake Garda (Val Giudicaria) they pushed forward in the autumn and got close to Riva. On the east side of the lake, by the end of the year they were in the outskirts of Rovereto. Farther east, on November 7, Col di Lana was taken by Garibaldi, but later aban-

\* Count Luigi Cadorna, born (1850) at Pallanza, son of Gen. Raffaele Cadorna; graduated from military academy at Turin (1868); colonel (1892); commander of Tenth Regiment of Bersaglieri; chief of staff of the Army of Florence; major general (1898); commander of the division at Naples (1907) and at Genoa (1910); designated commander of an army in case of war (1911); chief of the general staff; preparation for participation in European War worked out by him in detail and he became generalissimo of the entire Italian army; author of notable pamphlets on tactics.

done, only to be recaptured in April, 1916. In the Carnic Alps the Austrians made desperate efforts to dislodge their adversaries from the passes seized by them in June, but to no avail; the Italians held. They failed, however, to get the Malborghetto works, but had better success in forcing the Austrians to abandon the Plezzo valley. South of Plezzo, Tolmino was invested, but without success.

The nature of events on the eastern frontier was almost wholly determined by the obstacle forming the line of separation between the contending armies, i.e., the Isonzo River. From its left (Austrian) bank rise ridges upon ridges, whereas the right bank, from which the attack must come, below Gorizia (Görz), is flat (the Friuli plain). In crossing the river, therefore, the Italians would be compelled to fight uphill. The rectangle Gorizia-Gradisca-Triest-San Daniele is occupied by the Carso (Karst) plateau, with hills from 150 to 1700 feet high. This plateau would have to be taken, or at least a passage opened through it, before Triest could be reached. On May 24 Italian troops occupied various small towns just across the frontier. Their troubles began when they undertook to cross the Isonzo, for soon after reaching it they found it in flood. It is said that their difficulties were increased by the failure of the cavalry to seize the bridges at Pieris. A dash for these bridges would have insured a crossing and might have given possession of a part at least of the Carso plateau. As it was, the Austrians blew up the bridges before any Italians got across. The flood subsiding on June 5, a crossing was made at Pieris and Monfalcone occupied. But now a fresh obstacle presented itself. The Austrians flooded the low country at the foot of the Carso plateau. The advance against the plateau was thus blocked, and operations along the entire line delayed. Another crossing had to be sought unaffected by the flood conditions. The point selected was just above Sagrado, where the river makes a great salient to the west; unsuccessful attempts were made on June 9, 15, and 23.

It was therefore decided to make a general advance along the whole line of the Carso, a movement which began June 18. By the 23d various villages at the foot of the Carso had been taken. A fourth attempt to cross succeeded on the 24th. The Italians by the 27th had got a bridgehead on the Isonzo and a line of advance to the Carso plateau. This struggle formed part of a general struggle over the whole line from Plezzo to the sea. The conflict was necessarily intensified at certain points, such as Gorizia, Plava, and Tolmino.

**Gorizia.**—Gorizia lies in a bend of the river, and is dominated by the hills behind it stretching away into the general mountain system. On the west bank Monte Sabotino, itself commanded by the hills on the eastern bank, likewise controls the position; from Sabotino run out the Podgora heights well below (south of) Gorizia. Between Podgora and Gorizia is open ground 3 miles wide, bounded on the southeast by the river. Sabotino and Podgora, thoroughly organized defensively by the Austrians, were unsuccessfully attacked by the Italians at the end of May. They were more successful at Plava. Back of the village stands Hill 383, and south of 383 a peak known as Kuk. The Italians hoped, if they could get across, to work down the left bank and menace Monte Santo, the bulwark of the Austrians on

this bank in the Gorizia sector. Attempts to cross by bridging on the 8th and 10th of June were defeated, but on the 11th two battalions were got over by rafting and attacked Hill 383, securing a footing on the lower slopes. Reinforcements enabled the Italians on the 17th, after heavy fighting, to gain the summit. They held the hill thereafter in spite of the efforts of the Austrians to win it back, but were unable to extend their holdings on the left bank.

**Tolmino.**—At Tolmino the river turns 90 degrees from southeast to southwest. In the bend stand two hills joined by a saddle, Santa Maria and Santa Lucia. These were held by the Austrians, and formed with Sabotino and Podgora the only positions retained by them on the west bank of the Isonzo. North of Tolmino runs a range of high mountains, one of which, Monte Nero, rises over 7000 feet. Tolmino itself was a point of some military importance, probably because the Austrians, should the occasion arise, meant to use it as a point of departure in the invasion of Italy.

The resistance offered at Tolmino was more serious than apparently the Italians had expected. Their attempt to seize it by sudden attack failed, and they were compelled to proceed against the place by regular investment. In the meantime they were more fortunate 10 miles to the northwest at Caporetto, which they had occupied on the first day of the war. The heights across were turned by a column that crossed higher up, climbed the Polonnik ridge, and thus drove the Austrians back on the Monte Nero ridge. On June 2 the highest peak of the ridge was in the hands of the Italians. The occupation of Monte Nero was a necessary condition to operations directed southward against Tolmino, but Monte Nero itself was not safe unless Plezzo, an Austrian base and magazine, could be neutralized. By June 23, the Italians had succeeded in getting into positions from which they threatened the Plezzo valley. They now came down from the north against Tolmino. In August they attacked Santa Lucia and Santa Maria, but were compelled to resort to trench warfare. Later, in October, the offensive was resumed, without however succeeding in dispossessing the Austrians.

**Plava.**—The war had now lasted over five months without any result of magnitude on the Isonzo front. But on October 18, began a general bombardment from Plava to the sea, as a preparation for an extension beyond the Plava bridgehead in order to attack Monte Santo from the north, for the capture of Sabotino-Podgora, and for the occupation of the Carso plateau. Operations in the Plava sector proved unfruitful, owing to the inability of the Italians to capture Kuk. As long as this elevation remained in Austrian hands, it was useless to think of proceeding against Monte Santo. Hence the attack on the Gorizia front derived no help from the north. The fighting on this front lasted six weeks and at one time Monte Sabotino was actually taken but was not held. In December there was a lull but no cessation. As a result of their efforts the Italians had gained a little, and now turned their guns upon Gorizia itself. On the Carso plateau very little was achieved. Part of Monte San Michele was taken, as well as trenches on the northern slope of the plateau. But on the whole the Italian offensive had failed. The Austrian lines had held at all essential points.

At the end of the year 1915 Italy had gained one of her points. She had closed the gates of her northern frontier, and held the keys. A period of relative quiet then prevailed. In May, 1916, the Austrians began a successful drive down the Adige valley, forcing the Italians back over their own frontier at many points. The Italian towns of Arsiero and Asiago were captured. This campaign against Italy was brought to a sudden halt by the Russian offensive in Galicia, and in a short time the Italians had regained most of the lost ground. In August the Italians won their greatest victory of the war. This was the taking of Gorizia, the key to Trieste. The attack began in the Malfalco sector. Then San Sabotino and San Michele, the other two defenses of the city were taken with a rush. The city itself was attacked from all sides. A bloody engagement was fought at the Podgora bridge crossing the Isonzo. The Italians pushed eastward across the Carso plateau, which extends 22 miles to Trieste. They captured San Grado and several lines of trenches near Loguizza. On October 11 the Italians stormed the whole first line of Austrian defenses. They captured Loguizza and Jamiano. In November the Italians began another great offensive on the Carso plateau and advanced an average of  $\frac{3}{4}$  of a mile. They claimed to have taken 39,000 prisoners to date. The wintry months of December, 1916, and January, 1917, prevented further operations. Artillery and aerial engagements were frequent.

*Italian Spring and Summer Offensives.*—The winter on the Italian front was very severe and of long duration. The time was spent in increasing the entire military establishment on the front and (by the Italians) in preparing to meet an Austrian attack on the Trentino front, and in organizing an Italian attack in the southern part of the battleline. The plans of the Italian General Staff were as follows: First, to engage the enemy on the entire front from Tolmino to the sea in an intense artillery action which would leave him doubtful as to the real direction of the decisive attacks; then to attack on the right wing to the north of Gorizia, and, lastly, to strike out on the Carso.

Operations were begun on May 12, and on May 14, the infantry advanced from Plava and Gorizia. Initial successes were gained on Mount Cucco and Mount Santo. On the entire front the Austrians presented stubborn and determined resistance. The next day the Isonzo was crossed between Loga and Bodrez and new advances were made on the two mountains mentioned above, and on the Vodice ridge. By the 22d the advances were consolidated and the Italians had a firm grip on the whole mountainous ridge which separates the Isonzo from the deep valley which branches out in front of Anovo. The Italians had taken over 7000 prisoners.

In order to create a diversion the Austrians attacked in the Trentino region (May 19 to 22). Unsuccessful attacks were made in Val Sugana, on the Asiago plateau, around Lake Garda and in the Adige valley. A strong attack in force was repulsed by the Italians on the 22d, after temporary successes in the Piccolo Colbricon and in the Travnigolo valley. In these attacks the Austrians lost many men, killed, wounded, and captured.

On May 23, the Italian infantry, after tremendous artillery preparation, attacked on the southern edge of the Carso Plateau from Castagnavizza to the sea. Over 100 aeroplanes aided in this battle. Lucati, Jamiano, Bagni, and several

important heights were captured. On the next day the battle was resumed and extended from Gorizia to the sea. Allied monitors bombarded the extremity of the Austrian lines with heavy naval guns. The Italians advanced in the face of exceedingly stubborn resistance—counterattacks, violent shelling, and aerial bombardments from machines flying very low to the ground. The Italians in this phase of the battle took 17,000 prisoners and 20 guns and were within 11 miles of Trieste.

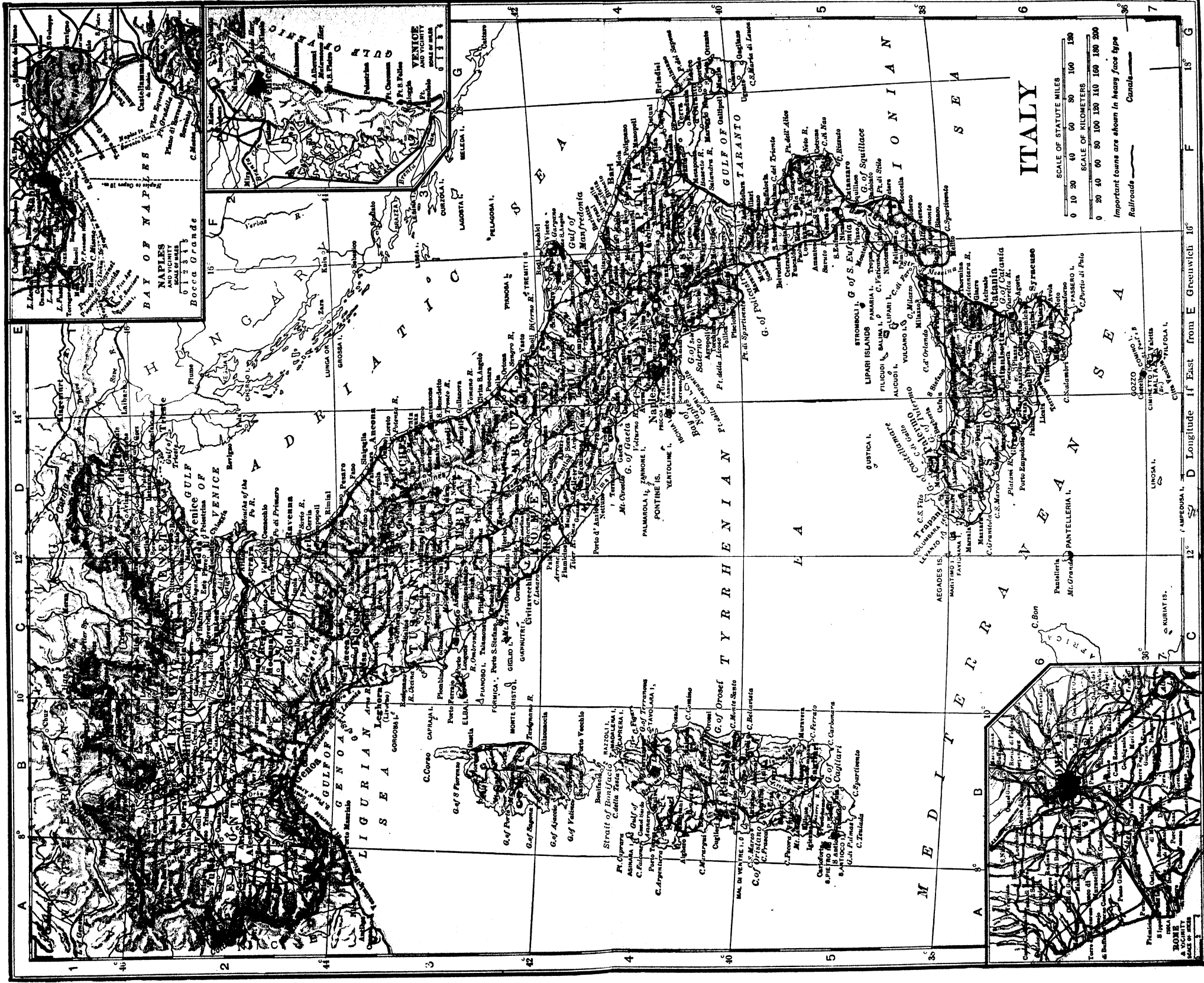
The Austrians on June 1 began an offensive which compelled the Italians to retire somewhat from their newly won positions. On account of the conditions in Russia (see above) they were able to bring up great quantities of men and material from the Eastern front. On June 3, a general attack from Mount S. Marco to the sea was begun and lasted with unabated intensity for three days. It was at first successful. Italian positions on Mount S. Marco were taken and positions on Dosso Fatti were penetrated. South of Jamiano the Italians were compelled to give up a strip of territory which they did not have time to consolidate. A counter-assault by General Cadorna in the Trentino compelled the Austrians to give up this offensive which was supposed to neutralize the Italian gains in the latter part of May. There is no doubt that the fighting on the Carso favored the Italians in the first months of the campaign, although it is doubtful if they penetrated the Austrian lines as far as the General Staff had hoped.

During July and the first part of August the opposing forces battled back and forth in an attempt to get advantageous positions. The Italians advanced on the Carso and took Dalino, and repulsed strong Austrian attacks in the Trentino. The Austrian artillery was everywhere active, as thought it was attempting to prevent the Italians from organizing an offensive on a large scale. Nevertheless, on the night of August 18, the Italians began a spectacular offensive from Tolmino to the sea, a front of approximately 37 miles. The attack was made by the Third Army, under General Cappello, which operated on the Bainsizza plateau, Monte Santo, and Monte San Gabriele, and the Second Army, under the Duke of Aosta, which operated in the Vippacco and Brestovizza valleys, and in front of the Hermada mountains. These armies were aided by Italian and British monitors in the Gulf of Trieste and by vast fleets of aeroplanes.

The Italians paved the way for their advance by a great engineering feat. They had diverted the course of the waters of the Isonzo River from its bed above Anovo and had built bridges across the shallow stream that remained. This work was done at night, and at daylight the stream was re-diverted to its regular channel. By means of these bridges and some pontoon bridges hastily constructed the Italians crossed the river on the 18th and gained a foothold on the northern part of the Bainsizza plateau. At the same time General Cappello's right wing began to envelope Monte Santo. These two movements compelled the Austrians to retire to the easternmost edge of the Bainsizza plateau. The Italians captured a vast quantity of military stores and food supplies, besides a great number of prisoners. From the nature of the Austrian defenses, it was quite apparent that the Austrian Staff thought this plateau impregnable. On August 24, the Italians occupied the summit of Monte Santo, 2240 feet high, and on September the summit of Monte San







# ITALY

SCALE OF STATUTE MILES

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200

SCALE OF KILOMETERS

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200

Important towns are shown in heavy face type

Railroads

Canals

Longitude 16° East from E Greenwich 16°

Longitude 12° East from E Greenwich 12°

Longitude 8° East from E Greenwich 8°

Longitude 4° East from E Greenwich 4°

Longitude 0° East from E Greenwich 0°





Gabriele, 1700 feet above the Isonzo and 300 feet above Monte San Daniele. The Austrians still held the eastern slopes of Monte San Gabriele.

The Duke of Aosta had been busy in the south in the meanwhile. His object was to surround the Hermada mountains, which were the key to Trieste, and to occupy the Vippacco valley. In his assault on the Hermada he was aided to a large extent by monitors and *aéroplanes*. He was unable to break through the Hermada mountains, however, and spent the entire month in fruitless efforts. During September and early October, General Cappello succeeded in driving the Austrians from the slopes of Monte San Gabriele, and also made slight gains on the Bainsizza and Carso plateaus. The objectives of the Italian summer campaign were to capture ultimately Trieste and Laibach. The capture of the former would destroy the submarine bases in the Adriatic, and the capture of the latter would open up the way to Vienna. The sudden German-Austrian blow at the northern extremity of the battle-line compelled the Italians to give up their entire gains of the year.

*Great Italian Retreat.* — As has been described above, the main Italian army was striking on a comparatively limited front on the Bainsizza plateau. The entire line of action was scarcely more than 12 or 15 miles long. This attacking force was composed of seasoned veterans. The armies protecting its flank were of unequal strength and were used for different purposes. Those on the upper Isonzo were territorials, i.e., older men who in peace times are held in reserve. They extended from Tolmino to Plezzo (Flitsch) and were to protect the flank of the Bainsizza army. The troops on the lower Isonzo were veterans, who were thrusting forward on the Carso plateau *pari passu* with the troops on the Bainsizza, and who were ultimately to march on Trieste. The German General Staff had been receiving calls for help from the Austrians for some time and at last gave heed to them. The strategy of the German plan was to strike at the unseasoned troops on the upper Isonzo, break through, and then cut the lines of communications of the other two armies by outflanking them. This plan was put into operation and worked exceedingly well. The task was made easier by the collapse of Russia, a superiority of artillery, surprise, socialistic propaganda, and cowardice, which General Cadorna claimed was exhibited by his troops on the upper Isonzo.

The battle began on October 21, with a bombardment of the Plezzo-Tolmino front and the northern flank of the Bainsizza plateau. Under cover of these guns the Germans and Austrians broke through the front-line trenches at Plezzo and Tolmino and crossed to the western bank of the Isonzo. Converging from these points on Caporetto, the Germans opened the way down the valleys of the Natissone and Judrio rivers. This move threatened the rear of the Bainsizza and Carso armies, and compelled them to begin a hasty retreat. By the 27th Berlin announced the capture of 60,000 Italians (mostly noncombatants used behind the lines) and 500 guns. This was accomplished by the capture of Monte Matajur, which dominated the Italian rear down the valleys of the two rivers mentioned above. The retreat from the plateaus through Gorizia across hastily constructed bridges over the Isonzo became a rout. On the 28th Civadale was taken, which opened up railway communication with Udine, the seat of the Italian General Headquar-

ters. This advance also compelled the Fourth Italian Army, which was guarding the frontier in the Carnic Alps, to abandon the passes on the frontier and retreat down the streams flowing into the Tagliamento and Piave rivers.

On October 30 Udine fell, and by the first of November the Teutonic Allies had reached the Tagliamento River. The Italians, particularly the cavalry, fought valiant rearguard actions to stem the tide of invasion and hold the line of the Tagliamento. So far they had lost 180,000 prisoners and 1500 guns. The Germans couldn't be stopped. They crossed the Tagliamento in scores of places, increased their number of prisoners to 250,000 (German report), and the number of guns to 2300. The next river flowing into the Gulf of Trieste was the Livenza. This offered very little chances of resistance and was defended merely to give more time to prepare the line of the Piave River, from 10 to 20 miles further west. This line had been a training base for recruits and was protected by modern trenches and other fortifications. French and British infantry and heavy artillery, which was sorely needed, was arriving daily in ever-increasing numbers. At this stage a change in command was made. General Cadorna was succeeded by General Diaz, who was to be assisted by Generals Badoglio and Giardino. The Allied reserves were held on the Adige line in case the Italians were unable to defend the Piave. The Adige line was very strong naturally and was practically incapable of a flanking movement such as had won all the rivers so far gained.

The strategy of the Austro-German Staff was now to outflank the lower Piave line, which was fairly strong, by seizing the Asiago plateau and the hills between the Piave and the Brenta and coming down the Piave valley. They also attempted to cross the lower Piave at several points and were successful at Zenson and one or two other points. They were driven back at all of these except the first. The Teutons were at a great disadvantage because they were unable to bring up their heavy artillery on account of the destruction of the railroads. The extreme lower Piave was protected by great naval floats and the Italian fleet. A large area between Venice and the mouth of the Piave was flooded, which effectively prevented further crossings near the coast.

The Central Allies now concentrated their efforts to break through in the neighborhood of the Asiago plateau, the weakest point of the Italian line. They captured the village of Asiago and other more or less important points, but up to January, 1918, they were unable to break through to the Venetian plains. The Italians gradually withdrew in the region from Lake Garda to the upper reaches of the Piave in order to strengthen their positions for defensive purposes. They grimly held on to Monte Tomba and Monte Monferiera that guarded the gateway to the plains between the Brenta and the Piave rivers. Mass attacks comparable to those used by the Crown Prince at Verdun were repeatedly made on these mountain slopes, but the rock trenches of the Italians held firmly. These peaks are a part of a chain of low mountains which stretch across the plain between the Piave and the Brenta. For more than three weeks this mountain range was the scene of extremely bitter fighting. Intense artillery duels were fought, and the Teutons and the Italians took turns at the offensive. Each side won local successes but the main Italian line held.

The Germans and Austrians made another

great effort to break through in the first week of December, 1917. This time they struck between the Brenta and Astico rivers. The main attack was delivered on a four-mile front from Ronchi valley to Monte Kaberlaba after heavy artillery preparation. This was where the new Italian line was anchored to the line held before the great retreat began. The Italians were about to withdraw when the attack was made. In three days furious fighting (5th to 8th) the Germans took 15,000 prisoners. The Italians were forced back to positions more easily defended. Their line had been U-shaped and the bulge had been driven into a straight line. Their line was based on a group of low mountains similar to those between the Brenta and the Piave. The Austro-German troops took these mountains one by one. On December 15 they stormed Col Caprille and took 3000 prisoners. On the 19th they also stormed Monte Asolone and took 2000 more prisoners. They were now within four miles of the plains that would lead them to Venice and outflank the Piave line. With a desperation born of despair, the Italians counter-assaulted and regained the lost positions on Monte Asolone.

As 1917 closed the battle of the Piave was still in doubt. Military experts seemed to agree that the Italians would be unable to hold the Piave line and thus would be compelled to retreat to the Adige. The Germans had taken almost 4000 square miles of territory, 300,000 prisoners, and 2700 guns, according to reports from Berlin.

*The Balkans. Serbia.*—Serbia began her mobilization July 26, 1914, and two days later Austria declared war. There seems to be reason for the belief that Austria lost time in passing to actual hostilities. Apparently she could have seized Belgrade at once, and thus secured a footing on Serbian soil, some days before the Serbians were ready to strike back. She delayed, however, and when she did move, it was across the Drina, on the west. An invasion from the Drina would lengthen her lines, but if successful would enable her to strike at the heart of the country. The lack of good communications would tell on one adversary as much as on the other, and would be largely compensated by Austrian superiority in transport. Accordingly after demonstrations on the Danube, on August 12, she sent her first troops over at Losnitza on the Drina, on the same day she crossed the Save near Shabatz. Other troops crossed the Drina at Zvornik and Liubovia. The direct objective of the Austrians was to reach Valievo, and thence Kraguyevats, the site of the National Serbian arsenal. The commanding generals on the respective sides were Potiorek (Austrian) and Putnik (Serbian).

The line of the Austrian invasion being known, the bulk of the Serbians moved to meet it in the direction of the Jadar valley, while sending troops to the northwest to offset the invasion from Shabatz. In the meantime the Austrians moved up the Jadar, and the Serbians, or as many as had come up to join the sparse forces falling back before the advance, intrenched at Jarebitze, across the valley. The Serbian cavalry, sent to reconnoitre the Matchva plain, reported the Austrians present in force, and therefore received orders, with the Serbian right, to prevent the Austrians from the north from joining the troops that had crossed the Drina. The main body occupied positions extending well to the south of Jarebitze, while other forces were detailed to beat off attacks coming

from Krupani, 15 miles south, and from Liubovia, another crossing of the Drina.

The battle opened in earnest August 16, on the Serbian right. The action, lasting all day, resulted in the defeat of the Austrians, and in bringing to nought their plan to join their forces on the Jadar. It also left the Serbians free to operate against Shabatz. On the 17th they pushed on to within 4 miles of that town, only to find it strongly defended; they therefore abandoned, for the moment, any further active efforts and awaited reinforcements. On the centre and left, the Austrians had better fortune, and succeeded in pushing back their adversaries. This was particularly the case on the Serbian extreme left. But on the 17th, the Serbians resumed the offensive, and captured two positions in the Tzer. Further south, however, the Austrians were again successful, and drove back the Serbians, who however intrenched, ready to move forward again the next day. On the 18th, the Austrians advancing from Shabatz, drove back the Serbs in front of the town, and at the same time prepared to resist the expected Serb attack on Kosannigrad, their main position on Tzer. This attack was successful, and the Serbs then turned their efforts against an elevation between the two mountain ranges (Rashulatcha) which was taken the following day, the 19th, on which the issue of the battle was decided. The Austrian right was beaten on that day, and the Serbs were now in possession of Tzer and Iverak. On the 20th, the Dobrava was crossed, fighting continued on the 21st, 22d, and 23d; on the 24th, the Serbs entered Shabatz. While these actions were going on, the Austrians farther south had been retreating to the Drina, and the invasion had failed. The losses on both sides in the battle of Jadar were heavy, probably 35,000 killed and wounded Austrians and 18,000 Serbs. The Serbs took 4000 prisoners, and gathered in a considerable quantity of guns, rifles, and military stores generally.

On September 1, the Serbs invaded Syrmia, a province lying between the Save and the Danube. On the whole, this step was ill-advised, and in any case of short duration, for now the Austrians were about to launch another invasion, like the first, from the line of the Drina, under the same general. About five corps composed this invading army. The attack opened over the whole line from Liubovia on the south to Jarak on the north. North of Losnitza the Austrians fared badly, save that they managed to acquire a strip of the Matchva plain. South of Losnitza, however, they established their crossing and drove back the Serbs to a line about 10 miles from the river, where they intrenched. Here they turned, and drove their adversaries out of the position. But no decisive result was achieved by either side, for in this region both settled down to trench work. A struggle ensued, however, for the Guchevo mountains, equally indecisive, for they were held by both.

After six weeks of position fighting the Serbs retreated, abandoning the Matchva and the Tzer. The Austrians followed over the whole frontier, entering Valievo on November 11. The Serbs now took up a position down the Kolubara River to the Lyg, up which their line turned to the southeast; the heights south of this position were occupied and protected by earthworks. On November 11, the Austrians attacked towards Lazarevat, and a detached force

20 miles southwest guarding the valley of the western Morava. On November 20, the first of these attacks proved successful and drove in the Serb centre. By the 24th, the action had extended over the whole front with continued success falling to the Austrians, who later in the month got possession of the Suvobor mountains, dominating, as it were, the Serbian positions. They had now succeeded in extending their front to Belgrade, and had thus cut the region in two, driving back the Serbs in the direction of Kraguyevats, on a line from the Belgrade railway to the western Morava. The situation was now saved to the Serbs by a resumption of the offensive. On December 2, they attacked and, on the 5th, recaptured the Suvobor, and drove back the Austrian right and centre to Valievo. The advance was equally successful in the other sectors. Its result was an interposition between the three Austrian corps on the south and the two farther north. The three southerly corps retreated as well as they could on the frontier. The action now turned towards Belgrade, towards which the Austrians were steadily driven back. The evacuation of the capital occurred on December 14 and 15. Nearly 42,000 Austrians were taken prisoners; 60,000 were killed and wounded.

**Bulgaria.**—Serbia was once more in October, 1915, called upon to defend her territory, for Bulgaria had finally decided to cast in her lot with the Central Powers. Accordingly her armies crossed the Serbian frontier towards Nish, striking in conjunction with the Austro-German forces, which had already begun their invasion from the north. Meanwhile French and English troops, debarked at Saloniki, were hastening up along the Saloniki-Nish railroad. The importance of the new campaign centred in the strategic value of the railroad, as there was no other line from Austria to Constantinople that did not cross Rumanian territory. At Velika Plana, 25 miles from the Serbian frontier, the railroad forks, its two branches running respectively to Belgrade and to Semendria, with the latter route in the Morava River. It was up this line that the Austro-Germans advanced, after capturing Belgrade.

In the first week of October the Austro-German army, reported to be 300,000 strong, crossed the Danube near Belgrade and at Semendria, while other armies attacked farther west along the Drina and Save rivers. Among the commanders of the invading armies was Field Marshal von Mackensen, in command of the army east of Belgrade.

Bulgaria's first operations were directed towards Nish. But realizing the danger of the arrival of Allied reinforcements from Saloniki, the Bulgarians then developed their main attacks farther south against the railroad, at Vrania and Vilandovo. At the latter point, only five miles from the southwestern corner of Bulgaria, an army of 40,000 men threatened to cut the railway. Serbo-French troops, however, hurried up, and threatening the Bulgarian town of Strumnitza behind these troops, compelled them to fall back. At Vrania, however, some 60 miles south of Nish, the Bulgarians were more successful.

The advance of the Austro-German columns from the north was at first slow, for by the end of October they had gained, advancing on a 100-mile front, only from 25 to 40 miles south of Belgrade. Another column about this time

crossed the Drina River at Vishegrad, and constituted a new army of invasion. In the south, however, the Bulgarians having seized the Nish-Saloniki railroad at Vrania, promptly confirmed their grip on the enemy's line of supplies by taking the important junction city of Uskub, and Veles, 25 miles farther south. And in the meantime, their columns directed towards Nish were making progress, and Pirot, on the Nish-Sofia line, was stormed after a four-day battle.

The Germans took the Serbian arsenal at Kraguyevats during the second week in November. In the meantime, the other Austro-German columns had reached the east and west line of the Western Morava, at Krushevats at Kraljevo, before the middle of the month. The fall of Nish was not long delayed, upon a heavy bombardment by the Bulgars. A route to Constantinople had already been opened via the Danube, when Germans and Bulgars joined hands near Orsova.

Meanwhile the Anglo-French forces from Saloniki held the railroad from Krivolak south to the frontier, and had gained some successes against the Bulgars around Strumnitza. But these, moving with ease around the French left to the Babuna Pass, 25 miles west of Krivolak, swept aside the small Serbian defending force, and descended through the mountains upon Prilep and Krushevo. The French were scarcely able to maintain their position on the Vardar and Cerna rivers, and the small British force was but little in evidence north of Doiran. An Italian supporting army was rumored to be about to land at Avlona.

The remaining strokes in Serbia's defeat followed quickly. Sienitza, Novibazar, Mitrovitza (the last the temporary Serb capital) fell in rapid succession before the Austro-German columns. Teutonic and Bulgarian invading forces joined hands at Prishtina, on the railroad branch south of Mitrovitza, which surrendered with 10,000 men. On the last day of the month, the two remaining cities of importance, Prisrend and Monastir, were lost to Serbia. Sixteen thousand prisoners were taken at Prisrend; the rest of the fugitive northern army was driven either into Montenegro or Albania.

At the beginning of December the main object of the German-Bulgar campaign in Serbia had been achieved. The Serbian army had been eliminated as a fighting force and the surviving Serb troops, fewer than 100,000 men, driven into Montenegro and Albania, where they were pursued by the Austrians, against whom they could make no stand whatever.

The retreat of the Serbs from Katchanik left the French left flank, on the Cerna River, in a critical position. The retreat of the Allies, however, was skillfully conducted, and they succeeded in escaping to neutral territory, where they fortified themselves at Saloniki, with the intention apparently of holding their position at all costs. Montenegro was conquered by the Austrians in January. The capture of Mount Lovcen, dominating Cetinje, determined the fall of the capital. The Austrians then proceeded to take Scutari in Albania (Jan. 25, 1916), and joined hands with the Bulgars at Elbasan, east of Durazzo, on February 17. The Italians abandoned the place February 26, and the Austrians now advanced against Avlona. The remnant of the Serbian army was transported by the Allies from the Albanian coast to the Island of Corfu to undergo reorganization. After

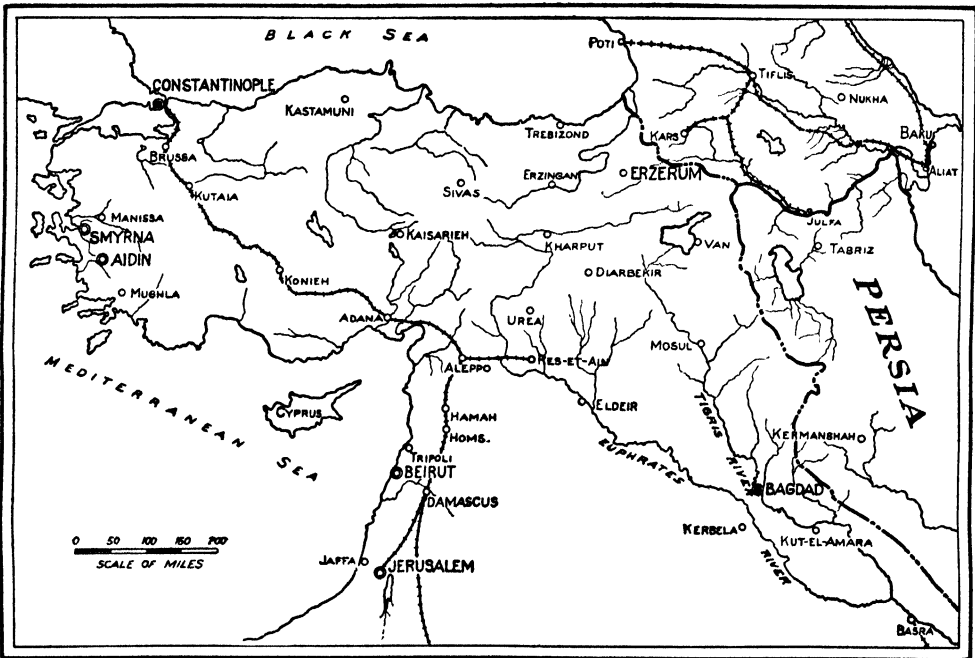
a few months' rest the refitted army of 100,000 men was taken to Saloniki to reinforce the French and British forces there and await developments in the Balkans.

The long-awaited Allied drive from Saloniki began on July 29, when the reorganized Serbian army began to move north. Within two days it was entrenched 300 yards from the Greek frontier. With the entrance of Rumania into the war, an Allied offensive from the Adriatic to the Aegean began (Aug.-Sept.). The Italians advanced in Albania, the French attacked from the Vardar to Lake Doiran, and the British crossed the Struma River and strongly entrenched themselves on the eastern bank. A Franco-Russian force advanced along the western bank of Lake Ostrovo and took Florina by assault on September 18. This opened up the road to Monastir, which was attacked by the French and Serbians about 15 miles northeast of Florina.

In the meantime the Bulgarians continued

important political success by capturing the city on Nov. 19. From a military point of view the victory was not so very important because severe weather prevented a successful pursuit. The entire front was quiet in 1917. The Allies' task was to move up the Varda, Struma, or Cerna valleys. This was made hopeless by the inactivity of the Russian armies. Local fighting occurred around Lake Doiran. The situation in Jan. 1918, was approximately as in Jan. 1917.

**Rumania.**—As has been stated above the question of Rumania's entrance into the war was settled on April 28, 1916. This new force added about 600,000 men under arms to the Allied cause and could increase this amount to 900,000 including the reserves. From the outset it was apparent that the Rumanian plan of attack was to invade Transylvania and thus attain the Rumanian ideal, i.e., to capture and hold the provinces of Austria-Hungary that were inhabited by Rumanians. As later events turned out,



their invasion of northern Greece. Early in September a Bulgarian force crossed the frontier and took the fort of Drama. The Greeks made only a slight resistance. Seres was then taken and the provisional government described above (*Outbreak of the War: Greece*) was organized. The port of Kavala, long desired by the Bulgarians, was next seized. The Germans claimed that the garrison asked them for food, shelter, and protection. The Greek soldiers were sent to Germany as guests of the nation in order not to violate Greece's neutrality. The fall of Kavala completely cut off the Greek soldiers in the far eastern part of Macedonia.

During the month of October the entire Allied line advanced. The Italian forces in Albania joined those of General Sarrail and thus prevented any attempt to envelop his army. The Serbians continued their advance and stormed Kitchiev on the 1st. They then crossed the Cerna and broke through the Monastir defenses. With the aid of the French they won a very im-

portant political success by capturing the city on Nov. 19. From a military point of view the victory was not so very important because severe weather prevented a successful pursuit. The entire front was quiet in 1917. The Allies' task was to move up the Varda, Struma, or Cerna valleys. This was made hopeless by the inactivity of the Russian armies. Local fighting occurred around Lake Doiran. The situation in Jan. 1918, was approximately as in Jan. 1917.

The geographical features of Rumania were to play an important part in her campaigns. In general the shape of the country is like a large Y. The bottom of the Y is bounded by the Black Sea and the two arms are bounded across their mouth by the Austro-Hungarian province of Transylvania. Russia is on the north and Bulgaria is on the south. The Alps (in Transylvania) and the Carpathians form formidable natural barriers. The Danube forms another natural boundary on the south for a part of the distance, but the acquisition of Bulgarian territory at the close of the Balkan Wars added a strip of territory bordering on the Black Sea which was peculiarly vulnerable. It later proved that this was going to be the point of Bulgarian attack and the starting place of the great German drive which ultimately resulted in the complete overrunning of the country.

Immediately after the declaration of war the Rumanian forces swept into Transylvania with all the vigor a new army on its first campaign

possesses. The first objectives were the two Transylvanian cities of Kronstadt and Hermannstadt just across the border. By the end of August both of these places had been captured with very little opposition. The Rumanians continued their impetuous advance apparently not taking into consideration the distance they were traveling from their base and also not considering their weak defensive line on the south. After the fall of Kronstadt they immediately struck west towards the coal fields. Another army, however, had crossed the Vulcan Pass and had captured Petroseny in the centre of these fields on August 31. A third army captured Orsova on September 1, after five days of the heaviest fighting the campaign had yet seen. On September 9 the Rumanians captured six more small villages and now held in their possession nearly one-fourth of Transylvania.

The campaign now assumed such serious proportions that Von Hindenburg was sent down with 450,000 men to check it. The Rumanians were not able to make any headway against the new enemy. They were forced to give up the Szurduk Pass and after the capture of Petroseny were forced to give up the Vulcan Pass also. The check, however, was only temporary, inasmuch as in the middle of September another offensive on a large scale was begun west of Hermannstadt. It succeeded in driving the Teutons out of both the Szurduk and Vulcan passes. It then pushed on into the Jiu valley.

This marked the high tide of the second Rumanian invasion, since the Rumanians suffered a severe setback at Hermannstadt. The victory won here by the Austrians and their German Allies was one of the greatest of the war. The battle raged four days and resulted in the complete annihilation of the first Rumanian army. The German army was divided into two parts. The first attacked the Rumanian front at Hermannstadt while the second by a rapid enveloping movement came up in the Rumanian rear and cut off their only line of retreat, through the Red Tower Pass. The fleeing Rumanians were swallowed up when they came to this pass by a large force of Bavarians. Von Falkenhayn now stood at the entrance to Rumania without being opposed by any real army. The second Rumanian army tried to save the precarious situation but came on the scene too late and was checked everywhere on a 50-mile offensive. The remains of the first army fled in great disorder through the Carpathians to the east and west of the Red Tower Pass.

Rumania was now threatened from another quarter, on the south. The forces in this sector were entirely insufficient to withstand the attacks of the Allied Bulgar and German army. The expected Russian reinforcements failed to arrive on scheduled time and another great drive similar to that in Serbia was begun. It entered the Rumanian territory in two columns. The first under Von Mackensen entered the Dobrudja and captured Tutrakan on September 3. The garrison of 20,000 men was forced to surrender. On September 10 Mackensen took a second large fortress, Silistria, which lies on the south bank of the Danube. The garrison of this fortress had been defeated by the Bulgarians in an attempt to relieve the fortress of Tutrakan.

The second invading column attacked along the coast of the Black Sea. It captured Dobric and the seaports of Kali Akra, Baltjic and Kavarna. The arrival of a Russian force, how-

ever, compelled the invaders to give up all of these places with the exception of Baltjic. The battle on this front now settled down into trench warfare with the Rumanians holding a strong position extending from the Danube to the Black Sea.

Rumania was now like a nut in the jaws of a nutcracker. Von Falkenhayn was pushing on from the north and Von Mackensen from the south. It was almost inevitable that she was to be crushed even as Serbia had been. Russian reinforcements had been sent to strengthen the Rumanian line but they only succeeded temporarily. The Grand Duke Nicholas was placed in charge of these forces and he was also military adviser to the Rumanians. In the middle of October, 1916, King Ferdinand of Rumania took personal command of the Russo-Rumanian army.

In the north the Germans pushed their way through the Vulcan Pass, having taken it by storm. Gradually Von Falkenhayn succeeded in pushing the Rumanians completely off the Transylvanian Alps. They also advanced further south of Kronstadt towards Kimpolung and the Sinaia, the Rumanian summer capital. They now had a grip on the railroad which ran to Craiova and then to Bucharest. By the last week in October Von Falkenhayn had reached Azuga, which was only 7 miles from Sinaia and almost on the border of the Rumanian oil fields. He also threatened to envelop the Rumanian army which still held Orsova. The Russians and Rumanians now made a strenuous effort to stop Von Falkenhayn's advance. They started an offensive on the Moldavian frontier, which while it lacked power at least held open the rail communication with Russia. In the region around Kimpolung and south of the Vulcan Pass the Rumanians not only checked the Germans but succeeded in pushing them back. By the end of October they had forced them back to the frontier in the neighborhood of the Szurduk Pass.

The trench warfare which existed in the southern sector was broken by Von Mackensen in the third week of October. On the 23d of this month he took Constanza and two days later the very important city of Cernavoda. This was the Danube bridgehead which controlled the railway to Bucharest. Constanza was the port of entry for Russian troops and supplies, sent to assist Rumania. Besides this Constanza was the largest seaport Rumania had and was the base of its Black Sea fleet. At Cernavoda the railway from Constanza to Bucharest crosses the Danube. This bridge is of immense size, being 11 miles long. The other side of it from Cernavoda crosses great swamp lands. The Germans did not immediately attempt to cross this bridge and pursue the Rumanians towards Bucharest. Instead they followed up the coast line of the Black Sea. On October 27 Mackensen seized the city of Hirsova. He had an opportunity to cross the Danube here by pontoon bridges, since the ground was not so marshy as it was in the vicinity of Cernavoda. By this time the flight of the Slavic Allies was precipitous and they did not attempt to hold any defensive positions. By the end of October Mackensen had established his line well north of the Constanza-Cernavoda railway. An attempted Rumanian offensive through Bulgaria in order to attack Mackensen's rear failed and the Rumanians were forced to retire to their own territory.

In the early part of the month of November

the Russians and Rumanians made strenuous and for a time successful efforts to stem the tide of German invasion. Their main aim was to save the Cernavoda bridge. When they retreated across this bridge they had destroyed only a few spans of it and evidently they were easily replaced by the Germans. In the north the Slavs were also temporarily successful, but were unable to withstand the Teuton push.

Von Falkenhayn's troops were pushing south through the Predeal, Vulcan, and Rothenthurm passes and were advancing down the Alt and Jiu valleys. They captured Tirgujiul and Liresht and then swept across the plains of Wallachia. A simultaneous movement was started in the extreme western part of Rumania near the Iron Gate. The object of these two drives was to capture Craiova, the capital city of western Wallachia. After administering a severe defeat to the Rumanian army, Von Falkenhayn took this place on November 20. He immediately fortified it strongly in order to have a base of attack on Bucharest. The Rumanians made preparations to hold the Alt valley as a defensive line. Mackensen activities in the south, however, prevented this.

He forced the crossing of the Danube at Zimnica, a spot where the river is both wide and deep. This threatened to cut the Rumanian line of communications and as a result the Alt River line was abandoned. The Vedeia River was next chosen as a defensive line, but this also had to be abandoned because the Germans crossed the Danube at another point and cut the railroad which supplied the Vedeia line. The Rumanians again started their retreat towards Bucharest. At each of the small streams the Germans had to cross, however, their defense stiffened, but never sufficiently to stop the invading forces. By the end of November the Germans had reached the Arges River, the last river of any size between them and Bucharest. The fall of the capital was now almost a certainty and the Rumanian government was moved to Jassy on the 29th.

The attack on the capital city was made from the north and south. The real danger to the city was from the north. The Rumanians made their last stand on the Averescu. The Germans, however, swept down from south of Kronstadt and crossed this stream themselves and after several victories captured Bucharest on December 7. On the same day Ploesci, in the centre of the oil district fell. The Germans then drove the fleeing Rumanians across the Jalonitz River and captured Mizil on the 12th and Buzeu on the 15th. The Slavic Allies retired to the Rimnik-Sarat River, which they managed to hold for five days. This enabled them to remove their supplies to Braila. The Germans forced the passage of the river on the 27th and pushed the enemy into Braila.

The Russo-Rumanians made a strong stand at the Matchin bridgehead, on the Danube. This really controlled the way to Braila. Nevertheless, in the face of a heavy artillery bombardment they were forced to retire from the bridgehead on Jan. 3, 1917. This cleared the Dobrudja of Russians and Rumanians with the exception of a small neck of land which extended towards Galatz. On January 5, Braila, Rumania's chief commercial city, fell into the hands of the Germans. The Slavic Allies were now completely driven out of the Dobrudja. The Russians were forced to cross to the north bank of the Sereth.

Fokshani fell on the 8th. A new line, formed on the Putna, had to be abandoned on the 10th. Vadani, 6 miles from Galatz, was captured on the 14th, but was recaptured on the 17th. Bitter fighting ensued until August, 1917, when the German drive was stopped. The line ran south of Galatz, then northwest along the Hungarian border to the Pruth, east of Czernowitz. The Teutons held all Rumania excepting part of Moldavia. Exposures made by the Russian revolutionists showed that Rumania was betrayed by Stürmer, the Russian Premier. The promised Russian protection on its flank had been withheld. The Rumanians entered an armistice with the Teutons in Dec. 1917. See *Eastern Theatre*.

**V. Southeastern Theatre.** The strategic importance of Turkey from the Germanic point of view lay in keeping supplies from Russia through control of the Dardanelles. Turkish military activity manifested itself on four distinct stages. 1. Caucasus. (a) Turkish thrust against Russia (1914-15); (b) Russian campaign (1916) forcing Turkish armies behind Trebizond, Erzerum, and Bitlis line to the west, and threatening Bagdad to the south. 2. Gallipoli campaign by Franco-British forces. 3. Turkish attack on Suez Canal. 4. British advance on Mesopotamia.

*Turkey, Caucasus, Egypt.*—War was declared between Russia and Turkey on Oct. 30, 1914, and between England (and France) and Turkey on Nov. 5, 1914. But at the end of July, 1914, Turkey had already begun to mobilize; by the end of October it was estimated that she had some 500,000 men in her army with 250,000 more at the depots.

These troops were concentrated in three principal groups; near Constantinople and in Asia Minor, in the Caucasus, and in Syria. The Turks under Enver Pasha, at once opened a winter campaign in the Caucasus. Here, indeed, they had been anticipated by the Russians, who, crossing the frontier, captured, on November 13, a position near Koprukeui and Erzerum. From this they were compelled to withdraw, but returning to the attack recaptured the place November 20. What had been intended as a mere demonstration by the Russians was converted into a serious matter by the initiative and energy of the Turks. The Russians would naturally advance by the Kars-Erzerum road. Hence the Turks purposed to hold the Russians on this road, while making an enveloping movement on the left against Kars and the Russian right. This plan came near succeeding. The Russians were pushed back from Koprukeui to Khorosan and were driven out of Ardahan on January 1. Two Turkish corps reached Sarikamish, the Russian railhead south of Kars, on December 25. But the weather and the season, together with the natural difficulties of the country, brought the plan to naught. One of the two Turkish corps was driven back from Sarikamish (January 1) and the other dislodged on the 3d. Ardahan was recaptured. The remaining body at Khorosan surrendered. Two Russian columns that had crossed the Turco-Persian frontier reentered Tabriz, which had been occupied by the Turks early in January, on January 30. Relieved from command in Europe and sent to the Caucasus, the Grand Duke Nicholas inaugurated a midwinter campaign, 1915-16, with an army estimated at 300,000 men. On Feb. 16 he took Erzerum with 13,000 prisoners. The part of the garrison that escaped fled to Trebizond, to

the Van region and elsewhere, with the Russians in pursuit. One column captured Bitlis on March 3, and advanced south in the direction of Sert. Another column marched on Erzingan. In the direction of Trebizond the Turks were defeated at Kara Dere, and Trebizond itself was taken April 20-21. A Turkish attempt to turn the Russian left in the neighborhood of Trebizond was checked, and the Russians continued their march westward. Baron von der Goltz was in command of the Turkish troops. Two flying detachments in Persia carried on operations, one in the Urumiah district, the

into three columns. The northerly one, of about 6000 men of all arms, followed the caravan road from Rafa to El Kantara; the southerly, of 3000, the pilgrim road from Nakhl to Suez; the middle column, that from Kossaima to Ismailia. This last road happened to be practicable at this time because a rainfall had filled a pool on the line. Pontoon boats accompanied the expedition, whose march was well organized and well carried out. On January 26 the advance guards of the south and middle columns were reported near the canal. The Turks were completely beaten (February 2-3). The main attack (Tussum-Serapeum) was made

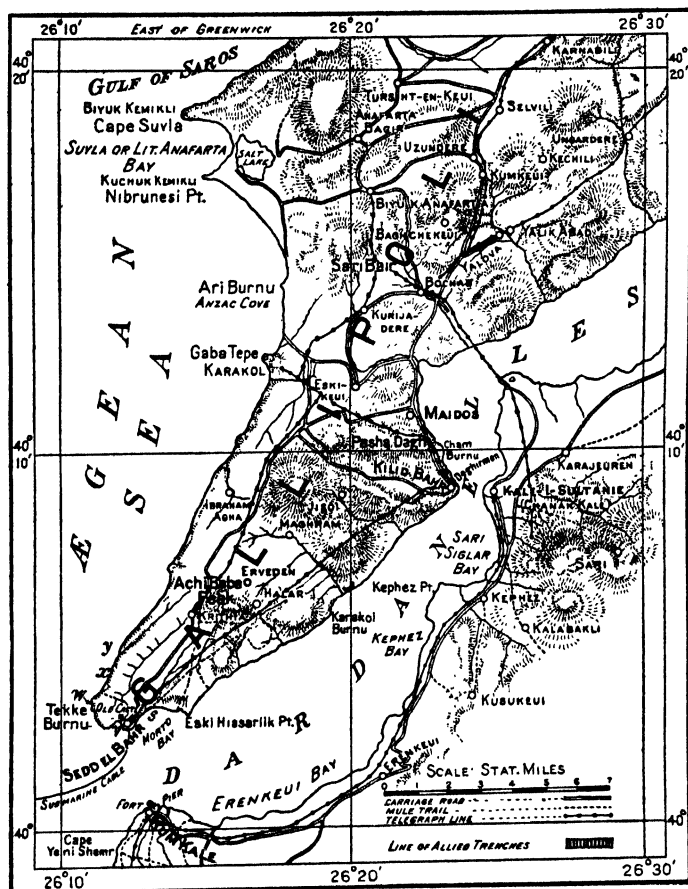
by the middle column; that of the southerly (Suez) was a fiasco; the northern made a better though vain effort (Kantara); on the night of February 6-7 a general retirement began.

The next serious threat on the canal was made in August, when the Turks attacked the British positions at Romani. The British gave way before a strong frontal and flank attack. Thinking they were retreating, the Turks sprang forward in pursuit order, and soon were lost in the dunes. Then the entire British front attacked and completely routed the Turks, driving them over 6 miles to a position east of Birs-el-Manca. Many guns and 2500 prisoners fell to the victors. In December the British captured El Arish and the strongly fortified position of Maghdabah. These victories effectively stopped further threats of raids on the canal. On Jan. 11, 1917, the British took six lines of trenches and 1600 prisoners at Rafa, on the Sinai peninsula.

**Dardanelles.**—The Turkish arms thus came to grief in both the Caucasus and in Egypt. Better fortune waited upon them in the Dardanelles. The temptation to strike a blow at the vitals of Turkey by taking possession of the Dar-

danelles, and hence of Constantinople, was irresistible. Success here would have met with a rich reward. A way would have been opened to supply Russia with the war munitions she so sorely needed; the Balkan question would have been settled out of hand, and in a manner favorable to the Allies. But the entire campaign was mismanaged from the outset; the nature of the effort to be made was certainly not correctly estimated; efforts were scattered, time was lost.

For the naval campaign, reference should be made to the naval subdivision of this article. It opened on Nov. 3, 1914, and it was not until the following March that joint land and naval operations were decided upon. By that time the Turks had received ample warning, and here, as elsewhere, under German leadership, had made what turned out to be more than ample preparation.



other from Kerman-Shah, taken by the Russians, towards Bagdad.

Simultaneously with the original Caucasian campaign mentioned above an expedition under Djemal Pasha was undertaken against the Suez Canal. The importance of this waterway to the Allies is self-evident. In anticipation of an attack upon it, troops had been collected in Egypt, consisting chiefly of East Indians and Colonials, with a few Imperial service units. In the canal itself several French and English warships took position to assist in the defense. Moreover, during the autumn and winter the position had been thoroughly strengthened by modern field fortifications; the defenses consisted of bridgeheads on the east covered by intrenched positions on the western bank at El Kantara, El Ferdan and Ismailia, Tussum and Serapeum, Shaluf and Kubri.

Djemal Pasha formed his forces of 30,000 men



In the Gallipoli peninsula nature was on the side of the defense. Furthermore the Turks enjoyed an advantage in their supply of men, for the bulk of their forces were in the neighborhood of Constantinople and could therefore be drawn on as needed. Gen. Sir Ian Hamilton was selected to direct land operations for the Allies. These were to be carried on by a French force under General d'Amade, drawn from north Africa, and by Colonials, Territorials, and some Indians from Egypt and Imperial troops.

On arriving at Tenedos (March 17), selected as his headquarters, Sir Ian made up his mind that the transports had been so badly loaded that he would not undertake any operations until the loading had been corrected. The transports were accordingly sent back to Egypt to be reloaded. Upon their return, five weeks had been lost to the Allies and gained to the Turks.

The British began their landing on April 25. How strong the force of the Turks was is not accurately known; it must have been well over 100,000. The German General Liman von Sanders had been appointed commander in chief of the Turkish forces at the Dardanelles. The chief landings were made at the tip of the peninsula. Once ashore, the advance was to be made against the village of Krithia, and the height of Achi Baba was then to be carried. At each of the beaches selected, the Turks were ready and received the landing party with tremendous fire. The Australian and New Zealand corps ("Anzac") near Gaba Tepe especially distinguished themselves by rushing the opposing Turks with the bayonet, clearing the slopes and securing a foothold on the top. The French landed a regiment on the Asiatic side, near Kum Kale, for the purpose of preventing an attack by gunfire against the transports at the base of the peninsula. In this they were more or less successful, but at considerable loss to themselves. The result of the work of the 4 hours was that the Anzacs, isolated, were holding a semicircular line against an enemy ever increasing in numbers, other landings were abandoned, some forces were holding their own but isolated, while other landing parties had managed to join hands. The next three or four days were marked by severe fighting and an advance of the British from the southern beaches. By the afternoon of April 28 some of the troops had pushed up to within 1300 yards of Krithia, but could get no farther. The lines then dug in. On May 1, the Turks attacked at night, and there was a counterattack the next day. This is the first so-called battle of Krithia. The second occurred on May 3, and was an attempt to win the Krithia ridge; his attempt failed, but the British advanced their lines 500 yards. The third came off on June 4, with the same objective and the same result. The fourth was fought on July 12, and resulted in an advance of 300 yards more or less. Achi Baba still remained in Turkish hands. Meanwhile, the Turks were attacking the Anzacs (May 5-10) and were repulsed. They renewed their efforts in great force May 18, and were again beaten off with great loss. There were other engagements, as that of the French (June 21) who captured a work known as the Haricot Redoubt, and the English action of June 28, known as the battle of the Gully Ravine. And so it went until fresh British forces were landed at Suvla Bay on August 7, and the Anzacs advanced upon the ridges of Sari Bair.

But before the landing at Suvla Bay, the Allies on July 12 made a fresh attack in front of Krithia. It resulted in the capture of trenches and was followed on the next day by another general attack, resulting in a similar capture. But no really significant success was obtained.

The Suvla Bay landing and simultaneous operations at the tip of the peninsula and by the Anzacs constitute the last great attempt to drive the Turks off the peninsula. Sir Ian Hamilton in May had asked for two additional corps. By the end of July he got them. His plan was now to reinforce the Anzacs and direct them to make a drive to capture Sari Bair. A landing at Suvla Bay would surprise the Turks, and might enable the Anzacs after taking Sari Bair to push on to Midos. The Turks at Krithia and on Achi Baba would thus be cut off. A containing attack was to be made at the tip of the peninsula. This attack was delivered on August 5 and failed. It was renewed on the 7th and resulted in minor local successes; its main purpose of keeping the Turks busy on the spot, and then preventing them from lending a hand elsewhere, may be said to have been realized. The Anzacs, reinforced, attacked on the 6th, and very nearly succeeded in their purpose; but on the 9th an assaulting column lost its way, and so arrived too late to clinch the positive gains already made on the spur to the southwest of the main elevation (Hill 305) of the Turkish position. During the attack on Sari Bair the landing at Suvla Bay was begun August 6 by night under the direction of Lieut. General Sir F. Stopford. It resulted in failure, for although the troops got ashore, yet once there they accomplished nothing. Apparently there was no well-thought-out plan of operations, or if there was, it was not carried out. Some of the troop units were landed at places other than those designated, others were late in moving out. Some local successes were obtained, however, and on the evening of August 7 the British extended in a semicircle around the bay. On the 8th the British stood fast and made no attempt to advance, and so lost their opportunity not merely to accomplish something on their own account, but to help their comrades farther south engaged in the desperate struggle of Sari Bair. The enemy were fewer in numbers than the British and were not in heart. The responsibility for the inaction of the 8th must rest with General Stopford, but Sir Ian Hamilton must come in for some part of the blame. There was more or less fighting during the next week; on the 15th General Stopford turned over the command of his troops to General de Lisle. Open fighting gave way to trench work. There was one more battle on August 21, when an attempt was made to take Hill 100, about two miles east of Suvla Bay. Sir Ian Hamilton was recalled in October, and the whole peninsula evacuated in December and January. See *SIDD EL BARR KALESI*.

*Mesopotamia.*—The long-standing conflict between British and German interests in the Persian Gulf cannot be said to have had any immediate military bearing on the decision of the British government to open a campaign in the Mesopotamia. British interests, however, called for protection, and in particular the plant of the Anglo-Persian Oil Company on Abadan Island, with its 150-mile long pipe line, and the oil fields at Ahwaz on the Karun River. This

plant, intended to furnish fuel oil for the royal navy, was an enterprise in which the government was financially interested. Moreover, a successful campaign in the great valley would hurt Turkey's standing in the Mohammedan world, and from purely a military point of view would prove of assistance to the Allies. A small force had been sent to the Gulf before the outbreak of hostilities. On November 7 it reached the mouth of the river and took a small village, Fao by name, three miles up. Thence the expedition moved up river to Abadan, for the protection of the works already mentioned, and November 11 had a brush with the Turks on the Turkish side of the river at Saniyeh. Reinforcements joined this column on the 15th, and the combined forces, after some minor engagements, on November 23 entered Basra after its evacuation by the Turks; and on December 9, after getting into the rear of Kurna, received the surrender of its garrison, 50 miles up river. The British now took up an intrenched position astride of the river, and perhaps might have been content merely to hold the road down to the sea if it had not been for the Turkish counteroffensive in April, 1915.

Early in January of 1915 the Turks were found to be holding a strong position north of Mezera. An expedition drove them out of their lines. They next appeared at Ahwaz up the Karun River. A reconnaissance showed them to be in strength, and it was evident that they were contemplating an attack on the main British position. This attack occurred April 11-12 at Kurna itself, Ahwaz, and Shaiba. The action at Shaiba lasted three days and resulted in a serious Turkish defeat. During May but little happened, but on May 31 the British moved out and proceeded up as far as 75 miles from Kurna. From Amara a road runs to Ahwaz, the control of which assured the security of the oil region. The Turks had in the meantime withdrawn to Kut-el-Amara, 150 miles up the Tigris.

On May 31 a Turkish force north of Kurna was dispersed; on June 3 Amara was occupied. The Turks withdrew to Kut-el-Amara. From the Tigris at this point a cross river runs almost due south to join the Euphrates at Nasiriyeh. Unless this cross river were in British control the Turks could use it to menace the British left. Hence a force was sent against Nasiriyeh and on July 24 captured the place, the Turks retreating towards Kut. Early in August General Townshend went up the river marching on Kut, and on September 25 contact was made. A battle was fought on the next two days, and at dawn on the 29th it was discovered that the Turks had evacuated the position of Kut-el-Amara and retreated on Bagdad. They were pursued and considerable loss inflicted on them. By September 30 General Townshend was within 100 miles of Bagdad by road and 200 by river. He continued his march, and at Ctesiphon, about 30 miles down river from Bagdad, fought, November 22-25, an indecisive battle against superior numbers. At first victorious, he was compelled in consequence of his lack of reserves and his shortage of ammunition to fall back in the face of Turkish reinforcements. He retreated to Kut after having lost about one-fourth of his total 20,000 men. Here he intrenched and was besieged by the Turks.

All attempts to succor him having failed, and his supplies being exhausted, General Townshend on April 30 was compelled to surrender

to the Turks, after a gallant defense protracted for 143 days. This surrender simply meant that the ill-advised expedition against Bagdad had failed; it was still the fact that the original purpose of the Mesopotamian campaign had been fulfilled. General Aylmer's relief expedition, setting out Jan. 6, 1916, after defeating the Turks in two battles, managed, January 21, to reach a point only eight miles from Kut-el-Amara. But floods now came to the Turkish rescue and Aylmer was forced to fall back. He set out again in February, better equipped with boats, and after meeting with a reverse at Felahie defeated the Turks at Umm-el-Heuna, April 5; the next day the capture of Felahie was announced. He was now within 23 miles of Kut; but the Turks in the meantime had occupied strongly intrenched posts to dispute any further advance, impeded as before by floods. Much fighting took place, and although some ground was gained the relief force was unable to gain any decisive success. General Aylmer's forces continued to hold their lines in the neighborhood of Kut during most of 1916. In December, 1916, and January, 1917, there were several engagements of a local character in the neighborhood of Kut-el-Amara.

In February, 1917, the Mesopotamian campaign again began to assume importance. As a result of local engagements and maneuvering for position the British by the middle of February had established their line on both banks of the Tigris, where it formed a bend west of Kut-el-Amara, and consequently hemmed in the Turks in this town. On February 23 bodies of British troops were ferried across the Tigris under the protection of artillery and machine-gun fire. These troops cleared the opposite bank sufficiently to enable General Maude to erect a pontoon bridge. By the next day part of the Shamrun peninsula and Sanna-i-yat were seized. The taking of these important positions compelled the Turks to abandon Kut-el-Amara and to retreat toward Baghela, 24 miles up the river.

The British cavalry followed the fleeing Turks on their right, the infantry their centre and gunboats on the Tigris their left. The last-mentioned forces caused considerable havoc among the Turks, by getting ahead of them and firing upon them as they advanced. The British left wing under Sir Percy Lake, crossed the Tigris below its junction with the Diala and marched on Bagdad, 20 miles away. On March 10, an attack on Bagdad from both sides of the river drove the Turks back on the city itself. During the night the Turks evacuated the city and left the British artillery captured at Kut-el-Amara and the greater part of their own. The fall of Bagdad was not of great strategic importance but had a great moral effect throughout the world. Besides that the entire cultivated lands of Babylonia fell into the hands of the British. A Russian offensive drove the Turks from Hamadan and gave promise of a Russian-British advance which would completely occupy Turkey in Asia. The Russian revolution upset these plans and enabled the Turks to withdraw troops from the Armenian front to stem the British advance. During June and July the Turks drove the Russians across the border into Persia and left the British left wing in a very exposed position.

After the fall of Bagdad the Turks retreated up the Tigris toward Mosul and up the Euphrates toward Aleppo. The main body took

first route with the idea of holding the headwaters of the Diala until they could rescue their army which was practically lost in Persia as a result of renewed Russian activities. The latter had crossed the border of Persia again and had joined with the British outposts. General Maude seized Feluja on the Euphrates with the general purpose of ascending that river and capturing El Deir which was the key to the crossroads leading to Damascus, Aleppo, and Mosul. The plan was to have the centre advance on Mosul, the right wing to clear the caravan route into Persia and the left wing to secure El Deir. The first step accomplished in this advance was the capture of Samara on April 23. This put the Samara-Bagdad railroad in the hands of the British and facilitated the bringing of supplies from the latter city. The British right flank was left in an exposed position again by the complete downfall of the Russian armies and the reoccupation of Khani-kan by the Turks (July) on the Persian border. This town controls the caravan route from Bagdad to Kermansha.

A word or two should be mentioned here of the revolt in the Hejaz (q.v.), which declared its independence under the leadership of the Grand Sherif of Mecca, Hujayn Ibn Aly, who took the title of King. This revolt was engineered by the Entente Allies and won over the orthodox Arabs and the Syrians opposed to Turkish rule. Arms and ammunition of the latest type were supplied to the revolutionists and they took several Turkish towns and seriously hampered the Syrian railway system of the Turks.

When fighting could be resumed, after the heat of the summer, the British on September 30 captured Ramadie on the Euphrates and the entire army of Ahmed Bey. This followed the brilliant storming of Mushaid Ridge on the previous day. On October 5, the Russians took by assault Nereman, 50 miles north of Mosul which was now seriously menaced. The British were within 100 miles of it on the south. They advanced still further when they took Tekrit 15 miles north of Samara. Operations halted here again for a long time because of the final collapse of the Russian forces with the consequent exposure of the British right wing. General von Falkenhayn, who had won such a great reputation for himself as Chief of Staff in Germany and as a commanding General in the Rumanian campaign, was now sent to Asia Minor to command the Turkish forces and spent the rest of 1917 building up the Turkish forces at Aleppo. He succeeded General von der Goltz, who had been assassinated.

*The 1917 Campaign in Palestine.*—As was stated above (section *Turkey, Caucasus, Egypt*) the British began an advance on Rafa on the Sinai peninsula in January, 1917. This town fell early in February and the British advanced northward toward Gaza and eastward toward Beersheba. They were compelled to spend the summer on the Gaza River after failing to take these places. In October they started forward again and by January, 1918, had won a series of brilliant successes. On October 31, Beersheba was taken in a sudden assault and on November 6 Gaza fell. By November 15, General Allenby had cut the Jaffa-Jerusalem railway at Ludd and Er Ramle. Two days later Jaffa, the port of Jerusalem was occupied. The British advanced down the Surar River valley toward the Holy City and up the Damascus-Beersheba rail-

way in order to encircle the city and cut off its supplies, so that it would not come under the bombardment of the artillery. All the towns surrounding the city were gradually taken by storm and as the British closed in it became apparent that the Turks would not risk a siege. The city fell on December 10. There was general rejoicing throughout the world over the return of the city to Christian hands after having been in Turkish hands for almost seven centuries. The Turks west and northwest of the city broke up into small bands and carried on gurilla warfare until the British finally got control of all the high land. General Allenby then pushed across a small stream 4 miles north of Jaffa and captured several small towns which gave him all the high land in the neighborhood, and assured a good defense of the Jaffa-Jerusalem railroad.

The success of the British arms in Palestine effectively put an end to Turkish threats on the Suez Canal and Egypt which had been going on for three years. It also revived the hopes of the Zionists, who dreamed of a reestablishment of the Jewish nation in Palestine. The British government announced on several occasions that it looked with favor on the Zionist movement.

*Colonies. Africa.*—As early as August 7 the British Imperial government telegraphed the South African government to suggest the desirability of seizing such parts of German Southwest Africa, "as would give them the command of Swakopmund, Luderitzbucht, and the wireless stations there or in the interior." But before operations could be carried on against German territory the local government found itself face to face with a rebellion in sympathy with, if not inspired by, Germany, and having for its end the establishment of independence. Maritz, one of its leaders, was, on October 26, completely defeated by loyalist troops under the direction of General Smuts, so that the rebellion came to an end in those parts. A more serious situation existed in the Union itself. But here too the loyalists prevailed. On October 27 General Botha took the field against General Beyers, the leader of the rebels, defeated him at Commissie Drift, and scattered his troops. On November 12 Botha routed De Wet at Mushroom Valley. A fugitive, De Wet was taken prisoner on December 1. Beyers, who in the meantime had collected another force, was again beaten December 7 and in escaping was drowned while trying to swim his horse across the Vail River. His death and De Wet's capture ended the rebellion, though small parties kept the field for some time afterward.

Togoland was taken in a campaign that lasted just three weeks, from Aug. 7 to Aug. 28, 1915. Surrounded on three sides by hostile territory, with the sea under British control, it could not hope to offer any resistance. The Allied base was the littoral; minor expeditions entered the country from the north, the east, and the west. The capital of the colony, Lome, fell on the sixth. The campaign thereafter had for its objective the powerful wireless station at Kamina, 125 miles from the coast. This point was entered, after some fighting by the Allies, on the 27th, and the colony surrendered by its Governor. The German forces could not have exceeded 1000, mostly natives.

Kamerun called for a more serious effort on the part of the Allies. Like Togoland, it was surrounded on all sides by hostile territory,

with the sea under Allied control. But its vastly greater area made operations more difficult and it was more strongly defended. Three expeditions from the northwest were defeated by the Germans in August and September, 1915. Attacking from the sea, however, the Allies took Duala (September 27) and from this point widened their holding. Early in October it was clear that the colony would be lost. Two columns pushed their way into the interior along the railways, one of which on October 26 took Edea, repelling six weeks later a counterattack for its recovery. The other column north of Duala captured the entire railway and advanced beyond its head. The French sent down troops from the Tchad, and others reinforced by Belgians from Equatoria. The result of all these efforts was that German resistance was well worn down, and came to an end with the surrender of Mora Hill early in 1916.

The situation in German Southwest Africa was complicated by the South African rebellion. This rebellion crushed, real operations began in January, Luderitz Bay having been occupied as early as Sept. 18, 1914. Swakopmund was occupied January 14. The campaign was directed against the capital Windhoek and carried on by two armies; the northern under Botha was to move from Swakopmund; while the southern under Smuts, divided into three columns, was to move east from Luderitz Bay, north from Warmbad, and west from Bechuanaland. By May 1, the end was near. On the 12th, Botha entered Windhoek and the struggle was practically over; for pushing on to Grootfontein, now the German capital, he there, on July 9, received the surrender of the enemy forces.

The most important colony in Africa, German East Africa, gave the British far more trouble than any of the others. Here the Germans disposed of some 8000 men, though all reports as to forces in the colonies are subject to caution, and the British forces at the beginning were insignificant, say 1200. During August, 1914, some successes fell to the British. For example, they demolished, August 13, the port of Dar-es-Salaam. On September 3, British reinforcements arrived in time to check German operations against the Uganda railway. September was taken up by German attacks without any special result. The British remained on the defensive, waiting for troops from India. These arrived November 1, and lay off the German port of Tanga. An attack made on the 4th resulted in a decided reverse for the British, who were compelled to reembark. The Germans now invaded British East Africa, but were pushed back to Jassin in German territory, where on January 18 they defeated the British, and forced a withdrawal of all the outlying posts in this region. They had, as early as September, 1914, invaded northeast Rhodesia, where they came into contact with Belgian troops. April, 1915, was spent in skirmishing. In July, 1915, the *Königsberg* was destroyed. This vessel, after doing much mischief, had been chased by British cruisers and had taken refuge (November, 1914) in the Rufiji River. Her guns, however, were removed and used in the defenses of Tabora, on the main east and west line of the colony. General Smith-Dorrien, later relieved by General Smuts, was sent out to take command of the troops in British East Africa and the invasion proceeded from that region, as well as from Nyassa on the south.

The British expedition commanded by Gen. Jan Smuts won an important victory at the Kitovo Hills, near the northern boundary of German East Africa. After five days of fighting (March 7-12) the Germans fell back to a position in the forest along the Rufu River. As a result of the operations that followed, the Germans, although reinforced, were compelled to abandon their positions and retire southward along the Tanga railway.

The Allies began in September to tighten the ring around the colony. The Belgians, French, British, and Portuguese were invading it from all sides. All of the seaports were in their hands and Tobora, a strong fortress in the north was captured (September 1-11), by the Belgians. Progress was slow but in December, 1917, its complete occupation was announced.

*The Pacific.*—Japan, as Great Britain's ally, declared war on Germany Aug. 23, 1914, but confined her offensive to Germany's possessions in the Pacific. On August 27, she began the blockade of Tsingtao, and by the end of September, two Japanese armies and a few English troops had completed landing, one on the north, the other with the English at Rozan Bay. The German defenses consisted of three lines, the first of fortified hills, the second of 10 forts, the third of five. By September 28, the first two lines had been carried, and the siege was begun. October 31 a general attack was opened on the third line which was occupied November 6. The next day the place was surrendered with 201 officers and 3841 non-commissioned officers and men. The Japanese land forces engaged in the siege numbered 22,980 officers and men, with 142 guns. The British forces were far less numerous, 920 European troops and 450 Sikhs. The British casualties were insignificant, 12 killed and 62 wounded; the Japanese relatively very little greater, 236 killed and 1282 wounded. For the capture of other German islands in the Pacific see the section on *Naval Operations* in this article.

#### IV. NAVAL OPERATIONS

At the outbreak of the war the belligerent navies were constituted as shown in the subjoined tables. For the sake of space and conciseness, certain methods of lettering and abbreviation are used in the tables and throughout the article, viz.:

Abbreviations: *a.c.*, armored cruiser; *a.c.d.*, armored coast-defense vessel; *b.c.*, battle cruiser; *b.s.*, battleship; *c.*, cruiser (not armored); *des.*, destroyer; *Div.*, division (of a fleet or squadron); *g.b.*, gunboat; *Sq.*, squadron; *sub.*, submarine; *t.b.*, torpedo boat.

#### EXAMPLES AND EXPLANATIONS

First example: *b.s.* IRON DUKE (25d-10g13.5-22k).

Explanation: *b.s.* stands for battleship; small capitals indicate that the vessel is of the dreadnought type; 25d means 25,000 tons' displacement; 10g13.5, that the main battery consists of 10 guns of 13.5-inch calibre; 22k, that the maximum speed is 22 knots.

Second example: *des. Ferret* (0.75d-2g4.2g3-27k), *Hind* (same), *Hydra* (same).

Explanation: this means that the destroyer *Ferret* has a displacement of 750 (0.75 × 1000) tons, carries a main battery of two 4-inch and two 3-inch guns, and has a maximum speed of 27 knots; and that the *Hind* and *Hydra* are the same as the *Ferret* in all respects.

#### FORCES IN THE NORTH SEA AND ADJACENT WATERS

##### GREAT BRITAIN

FIRST FLEET (Admiral J. R. Jellicoe, commanding)

Flagship, *b.s.* IRON DUKE (25d-10g13.5-22k); tenders, *c.* *Sappho* (3.4d-2g6.6g4.7-20k), *des. Oak* (0.8-2g4.2g3-

32k); repair ships, *Cyclops* (11d-13k), *Assistance* (10d-13k).

1ST BATTLE SQ., 1st Div.: b.s. MARLBOROUGH (25d-10g13.5-22k), ST. VINCENT (19d-10g12-21k), COLOSSUS (20d-10g12-21k), HERCULES (same).

2d Div.: b.s. NEPTUNE (19d-10g12-21k), SUPERS (same), COLLINGWOOD (same), VANGUARD (same).

2D BATTLE SQ., 1st Div.: b.s. KING GEORGE V (24d-10g13.5-21k), AJAX (same), AUDACIOUS (same), ORION (23d-10g13.5-21k).

2d Div.: b.s. CENTURION (24d-10g13.5-21k), CONQUEROR (23d-10g13.5-21k), MONARCH (same), THUNDERER (same).

3D BATTLE SQ., 1st Div.: b.s. King Edward VII (16d-4g12, 4g9.2-19k), Hibernia (same), Africa (same), Britannia (same).

2d Div.: b.s. Commonwealth (16d-4g12, 4g9.2-19k), Dominion (same), Hindustan (same), Zealandia (same).

4TH BATTLE SQ., 1st Div.: b.s. DREADNOUGHT (18d-10g12-21k), TEMERAIRE (19d-10g12-21k), BELLEROPHON (same), Agamemnon (17d-4g12, 10g9.2-19k).

2d Div.: Not organised; ships under construction.

Scouts: 1st Sq., c. *Bellona* (3.3d-6g4-26k); 2d Sq., c. *Boadicea* (3.3d-6g4-26k); 3d Sq., c. *Blanche* (3.4-10g4-26k); 4th Sq., c. *Blonde* (3.4-10g4-26k).

1ST BATTLE CRUISER SQ.: b.c. LION (26d-8g13.5-28k), PRINCESS ROYAL (same), QUEEN MARY (27d-8g13.5-28k), NEW ZEALAND (19d-8g12-27k).

2D CRUISER SQ.: a.c. Shannon (15d-4g9.2, 10g7.5-23k), Achilles (14d-6g9.2, 4g7.5-23k), Cochrane (same), Natal (same).

3D CRUISER SQ.: a.c. Antrim (11d-4g7.5, 6g6-22k), Argyll (same), Devonshire (same), Roxburgh (same).

4TH CRUISER SQ.: a.c. Suffolk (10d-14g6-23k), Berwick (same), Essex (same), Lancaster (same).

1ST LIGHT CRUISER SQ.: c. Southampton (5.4d-8g6-26k), Birmingham (5.4d-9g6-26k), Lowestoft (same), Nottingham (same).

DESTROYER FLOTILLA of 1st FLEET: c. *Amethyst* (3d-12g4-22k), carrying flotilla commander.

1ST SQ.: c. *Fearless* (3.4d-10g4-25k) and 20 destroyers (0.8d-2g4, 2g3-28 to 30k).

2D SQ.: c. *Active* (3.4d-10g4-25k) and 20 destroyers (0.8d-2g4, 2g3-28k).

3D SQ.: c. *Amphion* (3.4d-10g4-25k) and 13 destroyers (1d-3g4-29k).

4TH SQ.: des. *Swift* (2.2d-4g4-35k) and 20 destroyers (0.9d-3g4-32k).

#### SECOND FLEET

Flagship: b.s. *Lord Nelson* (17d-4g12, 10g9.2-19k).

5TH BATTLE SQ.: b.s. *Prince of Wales* (15d-4g12-18k), Bulwark (same), Formidable (same), Irresistible (same), Implacable (same), London (same), Queen (same), Venerable (same). Scout: c. *Diamond* (3d-12g4-22k).

6TH BATTLE SQ.: b.s. Russell (14d-4g12-19k), Albemarle (same), Cornwallis (same), Duncan (same), Exmouth (same), Vengeance (13d-4g12-18k). Scout: c. *Topaze* (3d-12g4-22k).

5TH CRUISER SQ.: a.c. Carnarvon (11d-4g7.5, 6g6-22k), Sutley (12d-2g9.2, 12g6-21k), c. Liverpool (4.8d-2g6, 10g4-25k).

6TH CRUISER SQ.: a.c. Drake (14d-2g9.2, 16g6-23k), King Alfred (same), Good Hope (same).

MINE LAYER SQ.: c. *Andromache* (3.4d-6g2-20k), Apollo (same), Intrepid (same), Iphigenia (same), Latona (same), Navad (same), Thetis (same).

#### THIRD FLEET

7TH BATTLE SQ.: b.s. Caesar (15d-4g12-18k), Hannibal (same), Illustrious (same), Magnificent (same), Majestic (same), Mars (same), Victorious (same), Prince George (same). Tender: c. *Doris* (5.6d-11g6-20k).

8TH BATTLE SQ.: b.s. Albion (13d-4g12-18k), Canopus (same), Glory (same), Goliath (same), Ocean (same), Jupiter (15d-4g12-18k). Tender: c. *Proserpine* (2d-8g4-20k).

7TH CRUISER SQ.: a.c. Aboukir (12d-2g9.2, 12g6-21k), Hogue (same), Cressy (same), Bacchante (same), Euryalus (same).

8TH CRUISER SQ.: Not organised.

9TH CRUISER SQ.: a.c. Donegal (10d-14g6-23k), Monmouth (same), c. Europa (11d-16g6-21k), Amphitrite (same), Argonaut (same), Challenger (5.9d-11g6-21k), Vendicite (5.8d-10g6-19k), Highflyer (5.6d-11g6-20k).

10TH CRUISER SQ.: c. Edgar (7.4d-2g9.2, 10g6-20k), Grafton (same), Hawke (same), Theseus (same), Crescent (7.7d-1g9.2, 12g6-20k), Royal Arthur (same), Gibraltar (7.7d-2g9.2, 10g6-20k).

PATROL FLOTILLA. Consists of 6 scout cruisers as flagboats and the 6th, 7th, 8th, and 9th destroyer flotillas (79 boats—360 to 1060 tons); 7 old cruisers and the 3d, 4th, 5th, 6th, 7th, 8th, and 9th submarine flotillas (3 boats of 210 tons, 36 of 320 tons, 8 of 630 tons, 6 of 825 tons); also 24 torpedo boats of 250 tons.

COAST-DEFENSE FLOTILLAS. These are separately organised for each port and consist of 21 destroyers (320 to 480 tons), 44 torpedo boats (75 to 170 tons), and 7 submarines (210 to 320 tons).

#### FRANCE

(North Sea and Atlantic Forces)

2D LIGHT SQ.: *Armored Cruiser Div.*: a.c. *Marseillaise* (10d-2g7.6, 8g6.4-21k), *Aube* (same), *Condé* (same).

*Destroyer Flotilla*: c. *Dunois* (0.9-6g2.5-22k) flagboat; three divisions of 6 boats each (310 to 340 tons, 26 to 27 knots).

*Submarine Flotilla*: Five divisions with 5 destroyers as flagboats, 18 submarines (550 to 810 tons).

*Mining Flotilla*: Two mine layers (800d-20k), 1 gunboat (950d-21k), 1 destroyer (300d-26k).

*Schoolship Div.*: a.c. *Gloire* (10d-2g7.6, 8g6.4-21k), *Jeanne d'Arc* (11d-2g7.6, 14g5.5-23k), *Gueydon* (9d-2g7.6, 8g6.4-21k), *Dupetit Thouars* (same).

COAST DEFENSE. The mobile defense of Cherbourg, Brest, Rochefort, Dunquerque, and Bidasoa consists of 2 destroyers, 7 torpedo boats, and 11 submarines.

#### RUSSIA

(Baltic Sea only)

ACTIVE FLEET (Admiral von Essen, commanding)

BATTLESHIP SQ.: b.s. *Czarevitch* (13d-4g12-18k), *Imperator Pavel I* (16d-4g12, 14g8-18k), *Andrei Perosovany* (same), *Slava* (14d-4g12-18k), a.c. *Rurik* (15d-4g10, 8g8-22k).

ARMORED CRUISER SQ.: a.c. *Gromoboi* (13d-4g8, 22g6-20k), *Bayan* (7.8d-2g8, 8g6-21k), *Pallada* (same), *Admiral Makarov* (same), des. *Novik* (1.3d-4g4-30k).

DESTROYER FLOTILLA, 1st Sq. Base, Libau; 4 divisions of 9 boats each (350 to 580 tons, 26 knots).

2d Sq.: Base, Helsingfors; 2 divisions of 9 boats, 1 of 8 boats (350 tons, 26 knots).

SUBMARINE FLOTILLA, 1st Div. Base, Libau, 2 boats of 370 tons, 1 of 150, 1 of 129.

2d Div.: Base, Revel; 4 boats of 450 tons.

SHIPS IN RESERVE, battleships *Imp. Alex. II* (9d-2g12, 5g8-15k), *Petr Veliki* (10d-4g8-12k).

Armored cruiser: *Rossya* (12d-4g8, 22g6-19k).

Cruisers: *Diana* (6.7d-8g6-20k), *Aurora* (same).

Destroyers and submarines: Many building; some completed.

Torpedo boats: About 20 (108 to 150 tons).

#### GERMANY

HIGH SEAS FLEET (Vice Admiral Ingenohl, \*commanding)

Flagship: FRIEDRICH DER GROSSE (25d-10g12-23k).

1ST BATTLESHIP SQ., 1st Div.: b.s. OSTFRIESLAND (22d-12g12-21k), HELGOLAND (same), THURINGEN (same), OLDENBURG (same).

2d Div.: b.s. POSEN (19d-12g11-20k), NASSAU (same), RHEINLAND (same), WESTFALEN (same).

2D BATTLESHIP SQ., 1st Div.: b.s. Preussen (13d-4g11-18k), Schleswig-Holstein (same), Pommern (same), Schlesien (same).

2d Div.: b.s. Hannover (13d-4g11-18k), Hessen (same), Lothringen (same), Deutschland (same).

3D BATTLESHIP SQ., 1st Div.: b.s. KAISER (24d-10g12-23k), KAISERIN (same), PR. REG. LUITPOLD (same), KÖNIG ALBERT (same).

2d Div.: Ships not completed.

CRUISER SQ., Battle Cruiser Div.: b.c. SEYDLITZ (25d-10g11-29k), VON DER TANN (19d-8g11-27k), MOLTKE (23d-10g11-27k), DERFFLINGER (28d-8g12-30k).

LIGHT CRUISER SQ.: c. Köln (4.3d-12g4.1-27k), Kolberg (same), Mainz (same), Rostock (4.8d-12g4.1-27k), Strassburg (4.5d-12g4.1-27k), Stralsund (same), Dresden (3.6d-10g4.1-24k), Stettin (3.4d-10g4.1-24k).

DESTROYER FLOTILLAS: 1st Flotilla: 12 boats (550 tons-2g3 4-32.5k).

2d Flotilla: 12 boats (570d-2g3 4-32.5k).

3d and 4th Flotillas: each of 12 boats (640 tons-2g3 4-32.5k).

5th Flotilla: 12 boats (616 tons-2g3 4-30k).

6th and 7th Flotillas: each of 12 boats (550 tons-2g3 4-30k).

SUBMARINE FLOTILLAS; 1st Flotilla: 7 boats, U-81 to U-87 (910 tons).

2d Flotilla: 7 boats, U-14 to U-80 (295 tons).

3d Flotilla: 7 boats, U-7 to U-13 (255 tons).

MINE LAYERS FLOTILLA: Arkona (1970 tons), Nautilus (same), Albatross (2200 tons), Pelikan (2360 tons).

#### RESERVE SQUADRONS

4TH BATTLESHIP SQ.: b.s. Wittelsbach (12d-4g9.4-18k), Zähringen (same), Schwaben (same), Mecklenburg (same), Elsass (13d-4g11-18k), Braunschweig (same).

\* Oscar von Ingenohl, born (1857) at Neuwied; spent half of his seafaring life in the Far East in command of various vessels; attached to Admiralty in Berlin (1897-1901); accompanied the Kaiser on many of his cruises and for a time commanded the royal yacht *Hohenzollern*; rear admiral (1908); commander of second squadron of the high-sea fleet (1910); served in command during early part of European War, but was removed (February, 1915).

**5TH BATTLESHIP Sq.**: *b.s. Kaiser Barbarossa* (11d-4g9.4-18k), *Kais. Wilhelm der Grosse* (same), *Kais. Wilhelm II* (same), *Kais. Karl der Grosse* (same).

**ARMORED COAST-DEFENSE SQUADRON**: *a.c.d. Siegfried* (4d-3g9.4-15k), *Beowulf* (same), *Frihtof* (same), *Heimdall* (same), *Hildebrand* (same), *Hagen* (same), *Odsn* (3.5d-3g9.4-15k), *Aegir* (same).

**SQUADRON OF INSTRUCTION, Cadet and Seaman Schools**: *c. Freya* (5.6d-2g8.2, 8g5.9-18k), *Hertha* (same), *Vineta* (same), *Victoria Louise* (same), *Hansa* (same), *b.s. (old) König Wilhelm* (10d-22g9.4-15k).

**Gunnery School**: *b.s. Wettin* (12d-4g9.4-18k), *a.c. Blücher* (16d-12g8.2-23k), *Prinz Adalbert* (9d-4g8.2, 10g5.9-20k), *c. Augsburg* (4.3d-12g4.1-27k), *Danzig* (3.2d-10g4.1-23k), *Stuttgart* (3.4d-10g4.1-24k).

**Torpedo School**: *b.s. (old) Württemberg* (7d-6g10.2-16k), *a.c. Fürst Bismarck* (11d-4g9.4, 12g5.9-19k), *Friedrich Karl* (9d-4g8.2, 10g5.9-20k), *c. München* (3.2d-10g4.1-23k).

**Old battleships**: *b.s. Worth* (10d-6g11-17k), *Brandenburg* (same).

**Destroyers and submarines**: About 35 destroyers, 6 submarines, 50 torpedo boats and several old cruisers and coast-defense craft were in reserve or laid up.

### BELLIGERENT NAVAL FORCES IN THE MEDITERRANEAN

#### GREAT BRITAIN

**2D BATTLE CRUISER Sq.**: *b.c. Inflexible* (17d-8g12-27k), *Indomitable* (same), *Indefatigable* (19d-8g12-27k).

**1ST CRUISER Sq.**: *a.c. Defense* (15d-4g9.2, 10g7.5-23k), *Black Prince* (14d-6g9.2, 4g7.5-23k), *Duke of Edinburgh* (same), *Warrior* (14d-6g9.2, 10g6-23k).

**Light cruisers**: *c. Gloucester* (4.8d-2g6, 10g4-26k), *Chatham* (5.4d-9g6-26k), *Dublin* (same), *Weymouth* (5.3d-8g6-26k).

**5TH DESTROYER FLOTILLA**: 24 boats (550 tons-27 knots).

**Submarines**: 6 boats of 320 tons.

#### FRANCE

**FIRST FLEET** (Vice Admiral Boué de Lapeyrière, commanding)

**SECTION OF THE COMMANDER IN CHIEF**: Flagship: *b.s. Courbet* (23d-12g12-21k), *b.s. Jean Bart* (23d-12g12-21k), *c. Jurien de la Gravière* (5.6d-8g6.4-23k).

**1ST BATTLESHIP Sq., 1st Div.**: *b.s. Diderot* (18d-4g12, 12g9.4-19k), *Danton* (same), *Verdun* (same), *France* (23d-12g12-21k).

**2d Div.**: *b.s. Voltaire* (18d-4g12, 12g9.4-19k), *Mirabeau* (same), *Condorcet* (same), *Paris* (23d-12g12-21k).

**2D BATTLESHIP Sq., 1st Div.**: *b.s. Verité* (15d-4g12-19k), *Republique* (same), *Patris* (same).

**2d Div.**: *b.s. Justice* (14d-4g12-19k), *Democratie* (same).  
**LIGHT Sq., 1st Div.**: *a.c. Jules Michelet* (12d-4g7.6, 12g6.4-22k), *Ernest Renan* (13d-4g7.6, 12g6.4-24k), *Edgar Quinet* (14d-14g7.6-23k), *Waldeck Rousseau* (same).

**2d Div.**: *a.c. Léon Gambetta* (12d-4g7.6, 12g6.4-23k), *Victor Hugo* (same), *Jules Ferry* (same).

**Supplementary Battleship Div.**: *b.s. Suffren* (12d-4g12-18k), *St. Louis* (11d-4g12-18k), *Bouvet* (12d-2g12, 2g10.8-18k).

**DESTROYER FLOTILLA**: flagboat, *des. Bouchier* (0.70d-2g3.9, 2g2.5-32k).

**1st Div.**: 5 boats (0.73d-2g3.9, 2g2.5-32k).

**2d Div.**: 5 boats (0.4 to 0.45d-6g2.6-28k).

**3d Div.**: 5 boats (0.45d-6g2.6-28 to 31k).

**4th Div.**: 6 boats (0.33 to 0.4d-1g2.6-27 to 30k).

**5th Div.**: 6 boats (0.33d-1g2.6-29k).

**6th Div.**: 5 boats (0.75d-2g3.9, 4g2.6-30 to 32k).

**SUBMARINE FLOTILLA**: flagboat, *des. Dehorter* (0.75d-2g3.9, 4g2.6-31k).

**1st Div.**: *des. Arbalète* (0.3d-1g2.6-31k), 3 submarines (550 tons).

**2d Div.**: *des. Hallebarde* (0.3d-1g2.6-27k), 2 submarines (550 tons).

**3d Div.**: *des. Dard* (0.3d-1g2.6-29k), 2 submarines (550 and 490 tons).

**4th Div.**: *des. Mousqueton* (0.3d-1g2.6-29k), 3 submarines (550 tons).

**5th Div.**: *des. Sarbacane* (0.3d-1g2.6-29k), 2 submarines (550 tons).

**Mine layers**: *Casabiana* (945 tons), *des. Baliste* (300 tons).

**Schoolship Div.**: *b.s. Jaureguiberry* (12d-2g12, 2g10.8-18k), *Charlemagne* (11d-4g12-18k), *Gaulois* (same), *Marceau* (11d-4g13.4-16k), *a.c. Potruau* (5.3d-2g7.6, 10g5.5-19k), *g.b. La Hire* (0.9d-6g2.6-22k), transport *Tourville*.

**DEFENSE MOBILE**, At Toulon, 3 submarines, several torpedo boats, 1 mother ship for aeroplanes; at Biserta, 3 submarines and several torpedo boats.

**Morocco Div.**: *c. Du Chayla* (4d-6g6.4, 4g3.9-20k), *Cassard* (same).

**Levant Div.**: *a.c. Latouche Tréville* (4.7d-2g7.6, 6g5.5-18k), *Bruix* (same).

**Miscellaneous**: In addition to the active forces mentioned, there were 5 old battleships (1891-97), 4 old armored cruisers, and 10 old cruisers which were on special

service, in reserve, or laid up; also about 12 destroyers, 17 submarines, and 115 torpedo boats.

#### RUSSIA

**MEDITERRANEAN Sq.**: *a.c. Bogatyr* (6.7d-12g6-23k), *Oleg* (same).

#### GERMANY

**SPECIAL Sq.**: *b.c. Goeben* (23d-10g11-27k), *c. Breslau* (4.5d-12g4.1-27k).

#### AUSTRIA-HUNGARY

**BATTLE FLEET** (Admiral Haus, commanding)

**1st Div.**: *b.s. VIRIBUS UNITIS* (20d-12g12-21k), *Tegetthoff* (same), *Prinz Eugen* (same).

**2d Div.**: *b.s. Erzherzog Franz Ferdinand* (14d-4g12, 8g9.4-20k), *Radeitzky* (same), *Zrinyi* (same).

**3d Div.**: *b.s. Erz. Ferd. Max* (10.5d-4g9.4-20k), *Erz. Friedrich* (same), *Erz. Karl* (same).

**Cruiser Div.**: *a.c. Sankt Georg* (7.2d-2g9.4, 5g7.6, 4g5.9-22k), *Kaiser Karl VI* (6.2d-2g9.4, 8g5.9-21k), *des. Turul* (0.4d-1g2.8, 7g1.8-28k), *Veletur* (same).

**Scout Div.**: *c. Sava* (3.4d-7g3.9-27k), *Novara* (same), *Ad. Spau* (same), *Helgoland* (same).

**COAST-DEFENSE SERVICE, 1st Div.**: *b.s. Hapsburg* (8d-3g9.4-19k), *Arpad* (same), *Ebenburg* (same).

**2d Div.**: *b.s. Wien* (5.5d-4g9.4-17k), *Monarch* (same), *Buda-Pest* (same).

**Cruisers**: *a.c.d. Kronprinz Erzherzog Rudolf* (6.8d-3g12-16k), *a.c. Kaiserin Maria Theresia* (5.2d-2g7.6, 8g5.9-19k), *c. Kaiser Franz Joseph I* (4d-8g5.9-19k), *Aspern* (2.4d-8g4.7-20k), *Tegetar* (same), *Zenta* (same), *Panther* (1.5d-2g4.7-18k).

**Destroyer Flotilla**: 6 boats (0.8d-2g4-32.5k), 10 boats (0.4d-1g2.8-28k); reserve 1 boat (0.5d-6g1.8-26k), 6 boats (0.4 to 0.5d-misc.-20 to 23k).

**Torpedo-Boat Flotilla**: 12 boats (0.25d-2g2.8-28k), 24 boats (0.2d-4g1.8-26k), 12 boats (0.1d-2g1.8-28k), 6 boats (0.1d-2g1.8-26k), 11 boats (0.1d-2g1.4-19k), mother ship (13d-4g4.7-20k).

**Submarine Flotilla**: 2 boats (270 tons), 2 boats (300 tons), 2 boats (273 tons), 1 depot ship (1d-4g2.8-15k).

#### ITALY

**NOTE**.—Though Italy did not enter the war until later, for purposes of comparison the condition on Aug. 1, 1914, is given.

**ACTIVE FLEET** (Vice Admiral Marcello, commanding)

**FIRST Sq., 1st Div.**: *b.s. DANTE ALIGHIERI* (19d-12g12-23k), *GIULIO CESARE* (22d-13g12-28k), *LEONARDO DA VINCI* (same), *c. Nino Bixio* (3.5d-6g4.7-29k).

**1st Destroyer Flotilla**: 4 boats (0.7d-1g4.7, 4g3-30k).

**3d Div.**: *b.s. Regina Margherita* (13d-4g12, 4g8-20k), *Benedetto Brin* (same), *Emanuele Filiberto* (10d-4g10-18k), *Ammiraglio di St. Bon* (same).

**4th Destroyer Flotilla**: 6 boats (0.4d-4g3-29k).

**5th Div.**: *a.c. Giuseppe Garibaldi* (7.2d-1g10, 2g8, 14g6-20k), *Varese* (same), *Francesco Ferruccio* (same), *Carlo Alberto* (6.4d-12g6-19k), *g.b. Coati* (13d-12g3-23k).

**6th Destroyer Flotilla**: 6 boats (0.33d-1g3.5, 2g2-30k).

**SECOND Sq., 2d Div.**: *b.s. Regina Elena* (12.5d-2g12, 12g8-22k), *Vittorio Emanuele III* (same), *Roma* (same), *Napoli* (same), *c. Quarto* (3.2d-6g4.7-28k).

**3d Destroyer Flotilla**: 6 boats (0.7d-1g4.7, 4g3-30k).

**4th Div.**: *a.c. Pisa* (10d-4g10, 8g7.5-23k), *Amalfi* (same), *San Giorgio* (9.7d-4g10, 8g7.5-23k), *San Marco* (same), *c. Marsala* (3.5d-6g4.7-29k), *g.b. Agordat* (1.3d-12g3-23k).

**2d Destroyer Flotilla**: 6 boats (0.4d-4g3-29k).

**IN RESERVE OR ON SPECIAL SERVICE IN THE MEDITERRANEAN**: Battleships: *b.s. CONTE DI CAVOUR* (22d-13g12-23k); old battleships, *b.s. Dandolo* (12d-4g10-16k), *Duilio* (same), *Sardegna* (13d-4g13.5-20k), *Sicilia* (same), *Re Umberto* (same).

**Armored cruiser**: *a.c. Vettor Pisani* (6.4d-12g6-19k).

**Cruisers**: *c. Libia* (3.7d-2g6, 8g4.7-22k) and 6 old cruisers (2200 to 3500 tons).

**Destroyers**: About 14 (300 to 700 tons).

**Torpedo boats**: About 93 (34 to 215 tons).

**Submarines**: 20 boats (110 to 463 tons).

**SHIPS IN FOREIGN WATERS**:  
*China Seas*: *a.c. Marco Polo* (4.5d-6g6, 10g4.7-19k).

*Red Sea and Indian Ocean*: *c. Piemonte* (2.6d-10g4.7-22k), *Calabria* (2.5d-6g4.7-16k).

#### TURKEY

**NOTE**.—Though Turkey did not enter the war until later, for purposes of comparison the condition on Aug. 1, 1914, is given, adding the GOEBEN and BRESLAU. The battleships building in England were taken over by Great Britain at the outbreak of war. So far as known the Turkish navy had no fleet or squadron organization. The vessels were as follows:

**Battle cruiser**: SULTAN SELIM JAVUZ (ex-Goeben) (23d-10g11-27k).

Battleships (old): *Kheyr-ed-din Barbarossa* (10d-6g11-17k), *Torgut Reis* (same).  
 Old b.s. reconstructed as a.c.: *Messudieh* (10d-2g9.2, 12g6-16k).  
 Coast-Defense vessel: *Muin-i-Zaffer* (2.7d-4g6-12k).  
 Cruisers: *Medilla* (ex-Breslau) (4.5d-12g4.1-27k), *Hami-dieh* (3.8d-2g6.8g4.7-22k), *Medjidieh* (3.4d-2g6, 8g4.7-22k).  
 Destroyers: 4 boats (0.6d-2g3.4-35k), 6 boats (0.8d-various-25 to 28k).  
 Torpedo boats: 10 boats (96 to 165 tons-27k).  
 Submarines: none. Many small gunboats.

### BELLIGERENT NAVAL FORCES IN THE BLACK SEA

#### RUSSIA

ACTIVE FLEET (Admiral Eberhard, commanding)

BATTLESHIP Sq.: b.s. *Panteleimon* (13d-4g12-16k), *Tri Sviatitsiya* (13d-4g12-17k), *Joann Zlatoust* (13d-4g12, 4g8-16k), *Sviatos Esvasti* (same), Repair ship *Kronstadt* (16d-13k).  
 Destroyer Flotilla: 1st Div.: 6 boats (615 tons, 25 knots); 2d Div.: 6 boats (360 tons, 26 knots); 3d Div.: 6 boats (250 tons, 26 knots).  
 Submarine Div.: 2 boats (240 tons), 2 boats (150 tons).  
 Mine layers: *Beresany* (5d-12k), *Prut* (same).  
 Submergible mine layer: *Krab* (500 to 700 tons).  
 RESERVE SHIPS: b.s. *Georgi Pobedonosets* (11d-6g-12-16k), *Sinop* (same), *Rostislav* (9d-4g10-16k), a.c. *Kagul* (6.7d-12g6-23k), *Pamyat Mercuria* (same). Torpedo boats, 10 (88 to 164 tons).

### BELLIGERENT NAVAL FORCES IN THE PACIFIC AND INDIAN OCEANS

#### GREAT BRITAIN

Battleships: *Triumph* (12d-4g10, 14g7.5-20k), *Swiftsure* (same).  
 Armored cruisers: *Minotaur* (15d-4g9.2, 10g7.5-23k), *Hampshire* (11d-4g7.5, 6g6-23k).  
 Cruisers: *Newcastle* (4.8d-2g6, 10g4-26k), *Glasgow* (same), *Yarmouth* (5.3d-8g6-26k), *Dartmouth* (same), *Fox* (4.4d-2g6.8g4.7-19k), *Philomel* (2.6d-8g4.7-16k), *Psyche* (2.1d-8g4-20k), *Pyramus* (same), *Pelorus* (same).  
 Submarines: 3 of 320 tons.  
 Australian navy: b.c. *Australia* (19d-8g12-27k), c. *Melbourne* (5.4d-8g6-26k), *Sydney* (same), *Encounter* (5.9d-11g6-21k), *Pioneer* (2.2d-8g4-20k). Destroyers: 3 boats (0.7d-1g4, 3g3-26k). Submarines: 2 of 825 tons.

#### FRANCE

Armored cruisers: *Montcalm* (9.5d-2g7.6, 8g6.4-21k), *Dupleix* (7.6d-8g6.4-21k).  
 Destroyers: 3 boats (0.3d-1g2.6-30k).

#### RUSSIA

Cruisers: *Askold* (6d-12g6-23k), *Jemtschug* (3.1d-6g4.7-24k).  
 Destroyers: 1st Div.: 8 boats (0.35d-26k); 2d Div.: 7 boats (0.24d-26k).  
 Submarines: 1 div. of 5 boats (175 to 200 tons).  
 Reserve: 4 torpedo boats, 3 submarines, 2 mine layers.

#### GERMANY

Armored cruisers: *Scharnhorst* (11.4d-8g8.2, 6g5.9-23k), *Gneisenau* (same).  
 Cruisers: *Emden* (3.6d-10g4.1-24k), *Dresden* (same), *Nürnberg* (3.4d-10g4.1-24k), *Königsberg* (same), *Bremen* (3.2d-10g4.1-23k), *Leipzig* (same).  
 Miscellaneous: Many unimportant gunboats, 500 to 1600 tons, of no fighting value.

### BELLIGERENT NAVAL FORCES IN THE NORTH ATLANTIC

#### GREAT BRITAIN

Temporary Squadron: a.c. *Monmouth* (10d-14g6-23k), and several old and unimportant cruisers.  
 Canadian navy: c. *Niobe* (11d-16g6-20k), 1 mine layer, 1 transport.

#### GERMANY

Cruiser: *Karlsruhe* (4.8d-12g4.1-27k).  
 Miscellaneous: Several fast passenger steamers which were turned into auxiliary cruisers.

#### FRANCE

Temporary squadron of two cruisers in Mexico.

Operations in the North Sea and the Waters about Great Britain. At the end of July, 1914, the German High Seas fleet was off the coast of Norway and nearly the whole of the British Grand fleet lay at Spithead off the Isle of Wight. As the probability of war increased, more and more definite steps were taken to prepare for mobilizing the entire British naval force and putting into full commission all ships in reserve and laid up. On August 2, German troops invaded Belgium and the same day the British Grand fleet was ordered to proceed to an unknown destination in the North Sea. On August 4, Great Britain and France declared war and mobilization of both fleets was directed. Within four hours of the declaration of war, British scouting squadrons were sent towards the German fleet and coast, one submarine flotilla exploring the Helgoland light.

The German High Seas fleet, being vastly inferior to the British forces facing it, was hastily withdrawn behind the defenses of the German coast at Kiel and in the Kaiser Wilhelm Canal which had fortunately been completed a couple of months before.

The laying of mines now proceeded with indescribable rapidity. It is supposed that the Germans had begun as early as July 29, but this is uncertain. Not only were the German harbors and the vicinity of Helgoland protected but the whole eastern part of the North Sea was planted with mine fields where they were most likely to be useful and the approaches to the Baltic were closed except a narrow strip along the Swedish coast in Swedish territorial waters and the channels through the mined area which were known only to German and Danish pilots. Denmark was forced to lay mines in her own waters by Germany which sent her an ultimatum stating that if she did not place them Germany would. According to British reports the German fields were extended over the whole southern part of the North Sea above a line joining the Hook of Holland with Harwich, England. The separate mine areas were small or narrow but were so numerous as to make navigation dangerous. The British thereupon closed the Strait of Dover by a mined area with boundaries consisting of the parallels of 51° 15' and 51° 40' N. latitude and the meridians of 1° 35' and 3° E. longitude.

They then began a systematic search for German mines, mine layers, and protecting forces, and also dispatched their mine-sweeping groups of trawlers as fast as work was found for them. It was in connection with mine planting that the first naval action of the war was brought about. On August 5, H.M.S. *Amphion* (3400t-25k), with the third destroyer flotilla, was carrying out a prearranged plan of search when a suspicious ship was reported by a trawler. This was the German mine layer *Königin Luise*, and she was chased and sunk; but early the next morning the *Amphion* struck a mine and was herself destroyed.

On August 9, the First Light Cruiser Squadron was attacked by three or more German submarines, showing only their periscopes. A lucky shot destroyed the periscope of one boat and the splash of countless projectiles blinded the view from the periscopes of the others. All except the injured boat disappeared and retreated but she came to the surface after a time quite close to the cruisers. Just as her



conning tower appeared sufficiently to note her name, *U-15*, a shot from the *Birmingham* tore a hole in its base and the boat sank like a stone. None of the British vessels was injured. For more than two weeks following this incident the British continued their scouting and dragging for mines. Frequent clashes took place between the patrol vessels but no serious damages were inflicted on either side.

On August 26, the Eighth Submarine Flotilla (eight boats), two destroyer flotillas, and their flag cruisers and tenders, were ordered to proceed to reconnoitre Helgoland and the waters to the southward. They were followed by the Battle Cruiser and First Light Cruiser Squadrons at a distance of 20 to 30 miles. On August 28, the destroyer flotillas, when about 25 miles from Helgoland, and not much farther from Wilhelmshaven, found the enemy in superior force and were compelled to fall back. Admiral Beatty\* promptly sent the First Light Cruiser Squadron to their assistance but, as the enemy's force seemed strong, he soon decided to follow with his heavy vessels. The advent of the battle cruisers quickly decided matters. In a short time, the German vessels were retiring along the whole front. The light cruisers, *Mainz*, *Köln*, and *Ariadne*, and the destroyer *V-187* were sunk. No British vessels were lost but the *Arethusa*, flagship of the destroyer fleet, was severely injured and had to be towed to England. As soon as his light vessels were safely withdrawn, Admiral Beatty retired the battle cruisers as he was operating in the vicinity of mine fields and was exposed to attack by submarines, several of which were seen. The *Queen Mary* was twice attacked and the *Lowestoft* once, but high speed in each case made the attempt abortive. The short range of the torpedoes used in German submarines was first noticed in these attacks.

The month of September was a particularly eventful one. On September 3, the British gunboat *Speedy* was destroyed by a mine and, on September 7, the light cruiser *Pathfinder* was sunk by the German *U-21*, the first surface vessel to fall a victim to the dreaded submarine. On September 9, the White Star liner *Oceanic*, now a naval transport, was run ashore in a fog and wrecked. On September 28, there came an event which startled the world and added greatly to the prestige of the submarine. About daylight that morning, the British armored cruisers *Aboukir*, *Hogue*, and *Cressy* were on patrol duty in the North Sea and steaming at moderate speed in column. At 6.25 A.M., the *Aboukir*, which was leading, was struck by a torpedo from a submarine and began to sink slowly. The *Hogue* and *Cressy* came up to her assistance, stopped, and attempted to save life. A little before 7 A.M., a torpedo struck the *Hogue*. She quickly capsized and sank; probably the torpedo exploded a magazine. About 7.15, the *Cressy* was hit by a torpedo and 15 minutes later by another. The reports indicate that, of the personnel of the three ships, 1067 were saved and about 1133 drowned. All were sunk by the German submarine *U-9*, a 300-ton

boat commanded by Kapitän-Leutnant Weddigen. The ease with which he performed his work was due to the lack of a destroyer screen and the folly of the *Hogue* and *Cressy* in stopping their engines in the known presence of submarines. The frightful loss due to this error caused the Admiralty to issue orders forbidding large vessels to proceed to the assistance of others under such circumstances.

After the *Aboukir-Hogue-Cressy* catastrophe the war against submarines was intensified. New types of mines were devised. Air craft began to scout for them and finally to destroy them by dropping bombs on their decks or in their hatches. Huge wire nets were built. Some were supported by floating buoys, others by buoys which were kept below the surface by the moorings. While it was expected that some submarines would become inextricably entangled in the nets, this was not relied upon. The nets were watched and when an entangled submarine came to the surface she was destroyed by gun fire. It was soon found that this watching could well be performed by very fast motor boats carrying 1, 3, or 6 pounders or a short 3-inch. Hundreds of these were built—many purchased in the United States. The speed was high—well over 20 knots in all cases and as near 30 knots as the size and condition permitted. By means of these and of nets stretching almost from shore to shore and in several places, the channel was kept nearly free from the enemy's submarines during the transport of troops and munitions of war to France.

During the month of October, the Germans lost a destroyer and a submarine; the British, a submarine, an old cruiser, and the dreadnought battleship *Audacious* by a mine. On November 3, a German scouting expedition along the Yorkshire coast destroyed a British submarine and slightly injured a gunboat. The armored cruiser *Yorck*, returning from this service, struck a chain of mines in entering the Jahde estuary and was sunk. A week later the gunboat *Niger* was sent to the bottom by a German submarine in the Downs north of Dover. On the 16th, the German auxiliary cruiser *Berlin* was interned at Trondjem; on the 20th, *U-18* was rammed by a patrol boat and foundered; on the 23d, the German destroyer *S-124* was sunk in collision with a Danish steamer; and on the 26th, the old British battleship *Bulwark* was blown up in Sheerness harbor. The loss of the *Bulwark* was due to some form of interior explosion in which her magazines were involved. The explosion was tremendously violent, only 14 of the complement of 815 escaping; and the ship sank in three minutes.

During the month of November, naval vessels were used to support the army by attacking the enemy's right flank wherever it reached the coast. Three small river monitors, purchased from Brazil, were found to be of great service in this work, their light draft of four and one-half feet enabling them to get close in shore.

On December 16, a German battle cruiser squadron, supposedly consisting of the *Derfflinger*, *Seydlitz*, *Moltke*, *Von der Tann*, and *Blücher*, raided the Yorkshire coast, bombarding the harbors and cities of Hartlepool, Whitby, and Scarborough (qq.v.). Nearly 100 noncombatants were killed and 500 wounded. None of the towns has forts or defensive works of any kind.

On Christmas day, a squadron of seven naval

\* Sir David Beatty, born (1871) in County Wexford, Ireland; entered navy (1884); served with Nile flotilla (1896) and in the advance on Peking (1900); aid-de-camp to King Edward VII (1906); naval secretary to First Lord of the Admiralty (1912); commander First Battle Cruiser Squadron (1912); K.C.B. (1914); vice admiral (1915), youngest officer ever to reach that grade; married a daughter of Marshall Field of Chicago.



seaplanes delivered an attack on Cuxhaven naval base but did no damage of importance; four of the aeroplanes were lost, though all the operators were saved. Bombs were dropped on or near the German warships lying in Schillig roads but none were materially injured. The only value of the raid seems to have been a gain in experience and some information of the enemy's condition.

The year 1915 opened with the sinking of the old battleship *Formidable* on January 1, by a German submarine in the Channel off Plymouth. This feat is specially remarkable as it took place at night and in a heavy sea, both conditions being very unfavorable to submarine operations. She was not, however, accompanied by destroyers and this enabled the submarine to approach on the surface without being seen.

On the morning of January 24, the fast cruiser fleet, in command of Vice Admiral Sir David Beatty, was patrolling in the North Sea (approx. Lat. 55° N., approx. Long. 5° E.). This fleet consisted of the First Battle Cruiser Squadron, *Lion*, *Tiger*, *Princess Royal*, *New Zealand*, and *Indomitable*; the First Light Cruiser Squadron, *Southampton*, *Nottingham*, *Birmingham*, and *Lowestoft*; and two destroyer flotillas. About 7 A.M., the cruiser *Aurora*, one of the destroyer flagships, sighted the German light cruiser *Kolberg* and a destroyer flotilla and, at 7.25, action began between them. About this time the German fast squadron (Rear Admiral Hipper), steering northwest, was sighted from the destroyer flotillas. This consisted of the battle cruisers *Derfflinger*, *Seydlitz*, and *Moltke* and the large armored cruiser *Blücher*. As soon as the information was signaled to Admiral Beatty, he headed for the enemy which had changed course to southeast as soon as they perceived the British battle cruisers. At 8.52, the *Lion* (flagship) opened fire on the *Blücher*, the rear ship of the German column, at a range of a little less than 20,000 yards but did not effect a hit until 9.09. The German vessels began to return the fire at 9.14; the *Tiger* began at 9.20, the *Princess Royal* a few minutes later, and the *New Zealand* at 9.40. The *Indomitable*, the slowest of the British ships, apparently did not get near enough to any of the German ships to open fire until after the *Blücher* was disabled. The last named had much less speed than the other German vessels and slowly dropped astern. About 10.48, she fell out of line and turned to the northward with a heavy list. The *Indomitable* was ordered to attack her and the others of the British fleet pushed forward after the main body. At 10.54, submarines were reported on the starboard bow of the *Lion*. The British fleet at once changed course towards the left. At 11.03, the *Lion* received a shell in her engine room which disabled her port engine and she hauled out of action, but Admiral Beatty was unable to transfer his flag to the *Princess Royal* until 12.20. The British squadron was now retiring, having pursued the enemy as close as possible to the areas protected by mine fields and submarines. The German losses are not exactly known. Of the *Blücher's* total complement of 885, about 200 were saved by British destroyers; and they were bombarded by German aeroplanes and a Zeppelin while engaged in this work. The German reports of the injuries to their three battle cruisers are not in agreement. One says that but a single battle cruiser was injured while another

congratulated the navy that none of the injuries received would require the ships to be docked. The British casualties were reported in full. The *Lion's* machinery was disabled by destruction of the feed tank; after trying to steam with one engine, that began to give trouble through priming so she was taken in tow by the *Indomitable*. On the *Lion*, 17 men were wounded; on the *Tiger*, one officer and nine men were killed and three officers and eight men wounded.

About January 26, the French torpedo boat No. 219 was sunk off Nieuport. On March 4, U-8 was rammed and sunk off Dover, the crew being made prisoners. On March 10, the auxiliary cruiser *Bayamo* was torpedoed by a German submarine and all hands lost. On the same day, U-12 was rammed and sent to the bottom by the destroyer *Ariel* and about the same date U-29 was sunk. The captain of this boat was Commander Weddigen who torpedoed the *Aboukir*, *Cressy*, and *Hogue*. On May 1, the British destroyer *Recruit* was sunk by a submarine and about May 7 the *Maori*, a much larger boat, was destroyed by a mine off Zeebrugge. On May 27, the British auxiliary cruiser *Princess Irene* was blown up in Sheerness harbor, only one of her crew escaping. Like the *Bulwark*, she was loading ammunition and it is supposed that a shell may have dropped from the upper deck to the hold and struck point down among many other projectiles.

On June 10, the British torpedo boats Nos. 10 and 12 were sunk by a German submarine and about the same time U-14 was destroyed and her crew made prisoners. On June 24, the armored cruiser *Rosburgh* was torpedoed but the damage was not so serious as to prevent reaching port; on July 1, the destroyer *Lightning* received injuries of similar gravity from a mine or torpedo, and, although the boat escaped to port, 15 of her crew were lost.

Early in July U-30 was accidentally sunk, but was raised within 48 hours and only one of the crew was found dead. On August 8, the patrol boat *Ramsey* was sunk by the German auxiliary cruiser *Meteor*, but before the latter could escape she was discovered by some British cruisers and was blown up by her commander to avoid surrender. On August 9, the destroyer *Lynx* struck a mine in the North Sea and immediately foundered; and, on August 12, the auxiliary cruiser *India* was sunk by a submarine while on patrol duty. During the early part of August the coast of Belgium was repeatedly bombarded by British vessels to assist military operations. It was reported that at Zeebrugge, which the Germans made a naval port, a number of vessels, including submarines and destroyers, were destroyed by the bombardment.

On August 19, British submarine E-19 grounded on the Danish island of Saltholm in the Sound. Two German destroyers, which sighted her in this position, violated Danish sovereignty by firing upon her in Danish waters. On August 23, a German destroyer was sunk by English boats near Zeebrugge and about the same time U-27 was lost—cause unknown.

Between October 1st and 4th, the Belgian coast was again bombarded to assist military operations. On October 28, the armored cruiser *Argyle* ran ashore and was wrecked. On November 4, German submarine U-8 was disabled off the Dutch coast and was towed into port where she was interned. This is apparently a

new boat with an old number as the *U-8*, reported sunk on March 4, was visibly destroyed and her crew made prisoners. On the same date (November 4), a German submarine of new type (length, 250 feet) was captured by being caught in a British wire net. On November 13, the yachts *Aries* and *Irene* were sunk while on patrol duty (circumstances not reported), and on November 17, the hospital ship *Anglia* was sunk by a mine in midchannel with a loss of 100 lives—chiefly of wounded men. On November 28, a German submarine was sunk off the Belgian coast by a bomb from a seaplane. On December 30, the armored cruiser *Natal* was destroyed by an internal explosion while at anchor. Of the complement of 725, 400 were saved. On Jan. 9, 1916, the *King Edward VII* was sunk by a mine. This battleship belonged to a class that was one of the last and best of the pre-dreadnoughts.

On May 31, 1916, began the greatest naval battle of the war up to that time. About four o'clock in the afternoon the British fast battle squadron of seven battle cruisers and four battleships met the German High Seas fleet of five battle cruisers and 24 battleships off the north-west coast of Denmark. The British engaged the enemy but fell back before the vastly superior force in the direction of their main fleet. In this part of the action they lost the battle cruisers *Queen Mary*, *Invincible*, and *Indefatigable*, and three armored cruisers—all of which were sunk; eight destroyers were sunk during the night attacks. The British Grand fleet came up about six o'clock, and soon afterward the Germans began to retire, pursued by the British. The action continued until after midnight, the night attacks being chiefly those of destroyers and submarines. The German losses are not definitely known but include the following, which are admitted by the German Admiralty: battleship *Pommern*, battle cruiser *Lutzon*, four fast cruisers, and five destroyers. The losses of officers and men were about: British, 5000; Germans, 3500; among the British were Rear Admirals Hood and Arbuthnot. The Germans were favored by misty weather, the close proximity of their own coast (which injured vessels could quickly reach), and by the fact that, a few minutes after the arrival of the main British force, mist and darkness obscured them from the enemy. Both the British and Germans claim that additional vessels of their opponents were destroyed. As regards the British losses, the ships alleged to have been sunk have been seen by disinterested observers; as to further German losses there is no proof.

On June 5, 1916, the British cruiser *Hampshire* was destroyed either by a mine or torpedo near the Orkney Islands. Lord Kitchener of Khartum and his staff lost their lives. The Secretary of State for War was on a mission to Russia.

The *Nottingham* and *Falmouth*, light cruisers, were sunk in the North Sea by German submarines on Aug. 19. On Oct. 26 German torpedo-boat destroyers made an unsuccessful attack on the cross-channel service. They lost two destroyers. The British lost the destroyers, *Flirt* and *Nubian*. On Nov. 23 torpedo boats raided the east coast of England near Ramsgate. They fired only a few shots and then retired. On Jan. 23, 1917, a battle between destroyers occurred in the North Sea. Berlin claimed two British vessels were sunk while all of hers returned. London admitted the loss of one vessel.

On Feb. 26, 1917, German destroyers bombarded Broadstairs and Margate on the English coast. They caused little damage and got away unscathed themselves. In a running fight off the Belgian coast on April 8 the Germans lost one destroyer and another was seriously damaged. Two German destroyers and two small British vessels were sunk near Dover on April 21. During April several raiding expeditions were carried out by the British and Germans. The former bombarded the submarine bases at Ostend and Zeebrugge, and the latter bombarded Ramsgate, Calais, and Dunkirk. During this month also American destroyers under Admiral Sims were sent to European waters and greatly aided in combating the submarines. In the early part of June the British sank the *S-20* and damaged another German destroyer. A few days later each country lost a destroyer by the explosion of mines in the North Sea. British vessels on several occasions crept close to the Dutch coast and captured or destroyed German merchantmen.

On September 5, Scarborough, on the English coast, was shelled by a German submarine. On Oct. 2, 1917, the British cruiser, *Drake*, was torpedoed and sunk off the northern coast of Ireland. On October 17, two German raiding cruisers attacked a convoy in the North Sea and sank 5 Norwegian vessels, 1 Danish, 3 Swedish, and the British destroyers *Mary Rose* and *Strongbow*. On the same day the American transport, *Antilles*, was sunk, with a loss of 70 lives. On November 1, another American transport, the *Finland*, was torpedoed, but she was able to return to the French port she had just left. On November 3 the British sank the German auxiliary cruiser *Marie of Flensburg* and 10 patrol boats in the Cattegat. On the same day they destroyed a crewless raider off the Belgian coast. This is a vessel loaded with high explosives, which will go off on contact. It was electrically controlled, run by gas engines, and is supposed to be steered into hostile warships.

On November 5, the *Alcedo*, an American patrol boat in European waters, was torpedoed and sunk with the loss of 21 men. On November 18, a skirmish occurred between British and German light forces, in which neither side did much damage. The British pursued the Germans to within 30 miles of the Bight of Helgoland. On November 19 the American destroyer, *Chauncey*, was sunk as a result of a collision in the war zone. Twenty-one lives were lost. On December 6, the American destroyer, *Jacob Jones*, was torpedoed and sunk with a loss of over 60 men. On December 17, German cruisers again raided a convoy in the North Sea and sank 11 ships, including the British destroyer, *Partridge*. This caused considerable comment in England and was the subject of an investigation.

*The Submarine Campaign.*—On Jan. 31, 1917, the German government announced to the world that with certain definite limitations a ruthless submarine warfare was to be carried on against all ships. For details see section, NEUTRAL NATIONS, *United States*. A brief description of the campaign will be given here, as well as a discussion of the methods used to combat it. Up to the time of the beginning of the intensive warfare the amount of tonnage sunk varied according to the British and German reports. The latter claimed that 4,400,000 tons, of which 3,000,000 were British, had been sunk by Feb. 1, 1917. The British Admiralty estimate was slightly more than 3,000,000 tons, both British and other coun-

tries. In the first month of the new warfare Berlin claimed to have sunk 368 vessels of 781,500 tons. These figures varied widely from those given out at London, which claimed that only 490,000 tons had been sunk. In her warfare, Germany made no distinction between neutral and enemy ships. Hospital ships and Belgian relief ships were sunk without warning. Three American vessels were also sunk.

Starting with March, 1917, the Admiralties of the Allied Countries began to report the submarine sinkings in a general way, so that it was impossible to gain facts as to tonnage destroyed and vessels sunk. The Admiralty of each country announced the number of vessels over 1600 tons and those under 1600 tons sunk, each week, as well as the number of arrivals and sailings. French estimates place the loss of tonnage in the first four months of 1917 at 2,500,000, which was more than the entire tonnage built in 1916. The weekly and monthly losses fluctuated considerably. April, June, and December, 1917, were high months, while July, August, and September were low months. A conservative estimate of the total tonnage lost during 1917 would be approximately 6,500,000. No figures were published concerning the loss of submarines.

The methods of fighting the submarines were many and varied. Small patrol boats 80 to 110 feet long, very fast, and mounted with small guns, patrolled the coasts of the Allied countries with great regularity. They were a hard mark to hit and their guns were heavy enough to destroy the frail submarine. All merchantmen were armed with guns as heavy as they could reasonably carry and were supplied with trained naval crews. Most of them were also supplied with wireless outfits in order to call for help if necessary. Aeroplanes were given definite routes to patrol and they did effective work, inasmuch as they were able to see a submarine quite a distance down in the water, even if its periscope were not showing above the water. They would then drop a bomb on it or would signal to a destroyer, which would come and drop a depth bomb, which was timed to explode at a given depth. All the Allied destroyers were supplied with depth bomb throwing devices. Another scheme used was the smoke screen. By means of chemical action a dense cloud of heavy smoke could be thrown around a vessel, which would hide it to such an extent that the U-boat would be unable to aim its torpedo with any degree of accuracy. Nets were also used as protections across the mouths of harbors and were often dragged through a given area, in order to enmesh a submarine. After the United States entered the war the old-time custom of convoying ships was revived, and to this is probably due the great decrease in the numbers of merchantmen sunk in the latter part of 1917. Lastly, the indirect method of building tonnage faster than it could be sunk was attempted by rapidly increasing shipbuilding in the United States and other Allied and neutral nations.

There is no doubt that the German government determined to risk everything on the submarine campaign to bring the war to a successful conclusion. It must have known that the United States and other neutrals would not for a moment stand for the restriction of the use of the high seas. The Entente Allies reiterated time and again that Germany would ultimately be beaten because her chief weapon, the submarine, had not proved a thorough success.

**Operations in the Baltic.** Mine laying by Germany and Russia began in the Baltic at least as early as in the North Sea. As stated in the remarks upon North Sea operations, the Danes were forced by Germany to close the Baltic by mining their own waters, leaving passages only known to the German and Danish pilots, except close in to the Swedish coast. German mine fields were very freely spread over the southern part of the Baltic in addition to covering the approaches to all German ports. Of the Russian fields less is known, but it is certain that a very large number of Russian mines were placed, particularly in the gulfs of Riga and Finland, and merchant vessels and others were warned of fields covering the Russian coast and harbors south of Lat. 58° 50' N. and east of Long. 21° E.; also of mines in the channels of the Aland Archipelago. The difficulty of defending Libau and Windau against the German army was thoroughly understood and the ships, stores, and munitions held at these ports were transferred to Reval, Helsingfors, Kronstadt, and Riga. At Libau there is a dockyard of considerable importance, second only to Kronstadt in its capacity for repairs, but Windau was a torpedo-boat base only.

As soon as the relations with Russia became strained, German ships began to patrol the coast from Memel to the Gulf of Riga; on August 4, the light cruiser *Augsberg* bombarded Libau without effecting serious damage, and on the same day, a German expedition took possession of the Island of Aland, which lies in the straits connecting the Gulf of Bothnia with the Baltic and is only a short distance north of the Gulf of Finland.

On August 27, the German cruiser *Magdeburg* ran ashore in a fog on the Island of Odensholm and was blown up to avoid capture by an approaching Russian naval force. It was reported that early in September Admiral von Essen, who commanded the Russian fleet, painted a number of his vessels to imitate German ships, hoisted German colors, and contrived, in foggy weather, to join a German scouting expedition unsuspected. At a convenient moment he opened fire, sank one German cruiser (said to be the *Augsburg*), and badly damaged another, while his destroyers severely handled the smaller craft. Before the Germans fully recovered from their surprise, he withdrew his force and escaped without material injury. On September 24, a German scouting expedition of about 40 vessels of all kinds appeared before Windau, but after firing a few shots retired.

On December 12, the German armored cruiser *Friedrich Karl* was sunk by a mine and on the 25th the old cruiser *Hertha* and a mine layer were attacked by Russian cruisers and reported sunk. The Russian submarines were now becoming effective and, notwithstanding the ice, were cruising in the Baltic; their first victim was a German torpedo boat sunk off Cape Moen, and, at about the same time and place, the German cruiser *Gazelle* was torpedoed and badly injured. During the remainder of the winter and the early spring the ice interfered with prosecuting operations of importance.

In June, 1915, the Germans began operations along the coast in support of the land forces. While endeavoring to lay mines in the way of the German fleet a Russian mine layer was discovered and sunk. On July 2, a Russian cruiser squadron drove off a German light

cruiser of the *Augsburg* class and several destroyers and forced the mine layer *Albatross* to run ashore in a sinking condition. On the same day a British submarine is reported to have sunk a battleship of the *Pommern* class.

During the spring and summer of 1915, the Germans busied themselves in repairing and re-equipping Libau as a naval base and from there began operations against Riga. During the month of August they made several attacks in force, but all failed. The Russian gunboats *Sivoutch* and *Koreetz* were destroyed and at least one German destroyer was sunk. British submarines had now reached the Baltic in considerable numbers, passing under the mine fields or through the Sound and along the Swedish coast. Their presence acted as a strong check on German operations, especially after the German armored cruiser *Prinz Adalbert* was sunk (October 23) off Libau. Early in November, a British cruiser squadron escorted a flotilla of submarines (estimates of observers range from 10 to 25) as far as the Skaw (north point of Denmark). From there they were accompanied by a destroyer flotilla until well past Elsinore and safely inside the Baltic. The Germans learned of the operation too late to prevent it. They had already placed a new mine field at the entrance to the Sound but the British seemed to have been able to avoid it.

The large number of British and Russian submarines in the spring of 1916 in the Baltic were said to have not only stopped German operations to the eastward of Danzig, but to have effected a completely successful blockade of the German coast against vessels coming from Sweden, many of which had been captured and sunk, or warned and turned back (if neutral), while a large number were loaded in Swedish ports but were afraid to venture out. This practically completed the British naval cordon about the Central Powers. On November 7, a British submarine sank the German cruiser *Undine*, and on December 19, another submarine sank the German cruiser *Bremen* and a torpedo boat.

For the chief operation of the German and Russian Baltic fleets in 1917, consult MILITARY OPERATIONS, *Eastern Theatre*.

**Operations in the Mediterranean.** On the day after war was declared the German naval force in the Mediterranean bombarded undefended seaport towns in Algeria, the battle cruiser *Goben* firing upon Philippeville and the light cruiser *Breslau* upon Bona. They then proceeded to Messina, Sicily, where they arrived on August 5. Being in a neutral port, they were required to depart within 24 hours; so, on the 6th, they left, steering south. Evading the British fleet which was seeking them, they were next heard of in the Dardanelles, where they arrived on August 11. Here they behaved to neutral steamers in a high-handed way which indicated German control of the Turkish government and foreshadowed the course taken by Turkey a short time later. To avoid immediate trouble for the Ottoman authorities they were supposedly sold to Turkey and renamed *Sultan Selim Javuz* and *Medillu*, but they apparently continued in command of German officers and retained a part at least of their German crews.

On August 9, Austria declared a blockade of the Montenegrin coast and bombarded Antivari. About the same date the French and British fleets established a blockade of the Austrian coast at the Strait of Otranto. The Austrians

had placed mine fields all along their coast, but their first victim was one of their own ships, the *Baron Gautsch*, which struck a mine on the 14th and sank at once with a loss of 67 lives. About the middle of August, the French and British forces swept up the Adriatic, driving the Austrians to the northward. They then attempted to take Cattaro for a naval base, but lacked the military force for a garrison and shore operations, and therefore failed. After a few weeks of futile bombardment of Cattaro and the Austrian positions on the Dalmatian coast they returned to the vicinity of Otranto Strait but continued to send scouting expeditions up the Adriatic.

The peculiar behavior of Turkey and the reported mining of the Dardanelles caused a British force to be maintained in that region. While on this duty the armored cruiser *Warrior* ran ashore and was injured on September 7. On the 10th, Turkey abrogated the capitulations with foreign governments and, during the latter part of October, permitted her vessels to sink Russian ships of war and attack Odessa. De facto war was begun by the Entente Allies on November 1; on the 5th, Great Britain formally declared war on Turkey and annexed the Island of Cyprus. On December 18, England declared a suzerainty over Egypt. On the 21st, the French submarine *Curie* was sunk while scouting along the Austrian coast. On November 24, Italy landed a force at Avlona to assist her protégé Essad Pasha against the Albanian insurrectionists.

In January, 1915, a Turkish army of about 12,000 men and six batteries of artillery attempted to seize the Suez Canal and then invade Egypt, where an insurrection had broken out fostered by Turkish emissaries. French and British vessels patrolling the canal succeeded in stopping the Turkish advance, and the operations at the Dardanelles then forced the recall of all available Turkish troops for the protection of Constantinople.

On February 24, the French destroyer *Dague* was sunk by a mine off Antivari. On April 28, the French armored cruiser *Léon Gambetta* was torpedoed by the Austrian submarine *U-5* and sank in 10 minutes. Rear Admiral Senes and all the officers were drowned, but 108 of the crew were picked up by French destroyers.

On May 24, Italy declared war on Austria; on the same day Austrian torpedo boats, supported by the light cruiser *Novara*, made a raid on the Italian coast, where they were first met by Italian destroyers and finally driven off by Italian cruisers. The Italian destroyer *Turbinia* was sunk early in the action. On June 10, the Italians captured Monfalcone with its shipbuilding yards.

On June 17, occurred a duel between an Austrian and an Italian submarine. As they approached, neither had any intimation of the presence of the other. The Italian boat, the *Medusa*, came to the surface first, swept the horizon with her periscope and, finding the vicinity clear, emerged. A few minutes later the Austrian decided to come up. When she sent up her periscope she saw the Italian boat close at hand and immediately torpedoed her. An officer and four men of the *Medusa* who were on deck when she sank were made prisoners. On July 1, the Austrian submarine *U-11* was sunk by a French aeroplane. *U-11* (860 tons) was lying on the surface when the aéro-

plane swooped down to within 45 feet of the water and dropped two bombs on the deck which caused her to sink almost instantly.

On July 7, the Italian armored cruiser *Amalfi* was sunk by an Austrian submarine while scouting in the upper Adriatic; nearly all the officers and crew were saved. On July 18, the armored cruiser *Giuseppe Garibaldi* was sunk by an Austrian submarine and a few of the crew were drowned.

The advent of Italy into the war completed the control of the Adriatic by the Entente Allies and, on July 6, Italy clinched the situation by a proclamation closing it to all merchant vessels not possessing special permits. Soon after the loss of the *Garibaldi* the operations of the Austrian submarines were much hampered by the destruction of their base on Lagosta Island by the French destroyer *Bisson*.

On or about August 13, the Austrian submarines *U-3* and *U-12* were sunk by the Italians. *U-3* was destroyed by gunfire, but *U-12* was sunk in a duel with an Italian submarine which torpedoed it. According to a report from Berlin, German submarines in the Mediterranean had, up to October 17, sunk 23 vessels, including four British transports.

On September 28, a fire broke out on the Italian battleship *Benedetto Brin* while she was lying at anchor in Brindisi harbor. The fire was quickly followed by an explosion which destroyed the ship. Of her complement of over 800 officers and men, only 8 officers and 379 men are known to have been saved.

On November 1, British torpedo boat No. 96 was sunk in collision at Gibraltar. On November 3, the British transport *Woodfield* was sunk by a submarine off the coast of Morocco; 6 passengers were killed and 14 wounded. About the same time the transport *Mercian* was attacked by gunfire from a submarine which probably had expended all its torpedoes. The *Mercian* was not sunk, but the casualties on board included 23 killed, 50 wounded, and 30 missing. On November 4, the French troopship *Calvados* was sunk by a submarine and between the 6th and 8th a submarine on the African coast sunk three small steamers, two Egyptian and one British. So far as reported only 53 of the 800 troops on the *Calvados* were saved. On December 5, the French submarine *Fresnel* ran aground while endeavoring to attack an Austrian light squadron. She was destroyed and her complement made prisoners. The Austrians report that at the same time they destroyed a small Italian cruiser.

During the month of December, the Italians landed a large force of troops in Albania. The expedition was most efficiently guarded against submarines and the only losses were the destroyer *Intrepido* and the troopship *Re Umberto*, which struck drifting mines. The loss of life in the two accidents was 43. In January, 1916, a cruiser of the *Novara* type was sunk by the French submarine *Foucault*.

The Italian dreadnought, *Leonardo da Vinci*, blew up in the harbor of Taranto on Aug. 2. The British transport, *Franconia*, was torpedoed on Oct. 5, and on Oct. 9, the French auxiliary cruiser, *Gallia*, was similarly sunk. The British ship *Britannic* was sunk by a mine in the Aegean Sea on November 21. On December 11, the Italian battleship, *Regina Margherita* struck a mine and sank and 675 lives were lost. In 1917, huge monitors operated successfully in the

attack on the Carso and in the defense of Venice. Light Italian motor boats armed with torpedo tubes were able to sail over the mine fields of Trieste and Pola, and in December, 1917, they entered Trieste harbor and sank two cruisers of the *Wien* type.

**Operations in the Black Sea and Dardanelles.** There are strong grounds for the belief that, at the outbreak of war, the Turkish cabinet was opposed to taking part in it, but that, as time went on, the German influence increased until the opposing members were won over, silenced, or driven from power. Among other significant facts it may be noted that the mining of the Dardanelles was not reported until August 19, eight days after the arrival therein of the *Goeben* and *Breslau*. On October 10, Turkey abrogated the capitulations with foreign powers concerning the jurisdiction of Turkish courts. By this time doubtless the cabinet had agreed upon its action, but much time was required to mobilize the army, and it is doubtful if the cabinet was ready to act when the operations of the *Goeben* and the Germanized fleet in the Black Sea precipitated matters. The commander in chief of the Turkish navy was now Admiral Souchon (late of the *Goeben* and the German Mediterranean squadron), while hundreds of German officers and 3000 men were distributed among the vessels of the fleet.

The first operations took place on October 29, when the Turkish squadron bombarded several Russian ports. A destroyer entered Odessa harbor, torpedoed and sank the gunboat *Donetz* and badly injured the *Kubanetz* (a sister to the *Donetz*), four merchant steamers (three Russian and one French), then fired upon the suburbs for the purpose of destroying oil tanks, but set fire to a sugar factory instead. On the same day the *Medilla* (ex-*Breslau*) bombarded Theodosia, seriously injuring the cathedral and other buildings; and the *Hamidieh* threatened to bombard Novorossisk if the city refused to surrender, but contented herself with embarking the Turkish consul. On their way to Sebastopol the Turkish destroyers sunk the Russian mine layer *Pruth*. The next day (October 30), accompanied by destroyers, the *Goeben* bombarded Sebastopol. By the return fire of the forts she was so badly injured that the admiral collected the squadron and returned to Constantinople. On November 7, the *Medilla* bombarded the small Russian town of Poti, but did no great damage. On the same day Russian forces shelled the Turkish ports of Zonguidak and Koslu, sinking at the former place three transports loaded with aeroplanes, artillery, and uniforms for 60,000 men; a colonel of the general staff, various German officers, and 248 soldiers were made prisoners. On November 17, the Russian squadron bombarded Trebizond, but without inflicting much damage.

On November 18, occurred the most important naval action that so far had taken place in the Black Sea. The Russian battleship division, returning from a cruise off the Anatolian coast, was about 30 miles from Sebastopol when the *Goeben* and *Breslau* were sighted. The *Evstafi* opened fire at about 8000 yards; the other ships following suit quickly. The Russians say that the *Goeben* was badly injured by the *Evstafi's* first salvo and was slow in opening fire; and that, after an action lasting 14 minutes, she and her consort retreated towards Constantinople, being able to escape through their su-

periority in speed. As the *Goeben* did not appear in the Black Sea for some months afterward, the report of her injuries was possibly correct, though Turkish advices stated that, some little time after this battle, the *Goeben* was injured by striking a mine.

Early in December British submarines began to make their way through the Dardanelles. On December 13, the *B-11*, in command of Lieut. Norman D. Holbrook, entered the Dardanelles, dived underneath five rows of mines and torpedoed and sank the Turkish battleship *Messudieh*. This brilliant exploit was soon followed by others of a similar character.

During January the Russian fleet sank several Turkish vessels in the Black Sea, including a number of troopships and transports, and shelled the Turkish naval station at Sinope. On the 17th the French submarine *Saphir* was sunk by a mine in the Dardanelles.

About the middle of February the combined British and French fleets began their fruitless attempt to force a passage of the Dardanelles. No operations in the whole course of the war were so poorly conceived and so inefficiently carried out. It is hard to understand the folly of the British government in embarking upon such an expedition. If there is one thing that is well understood in naval war it is the absurdity of attacking strong forts by ships without adequate military support. Even if the ships can drive out the garrison it will return as soon as the bombardment ceases. Unless the fortifications are badly placed they cannot be wholly destroyed and the ravages of bombardment can be largely restored by a few days' work. Permanence of victory can only be obtained by occupying the works as soon as the defenders are expelled.

But this was not all. The Turks are an unready race. When the operations began they had not more than 10,000 men on the Gallipoli Peninsula, and these were inadequately supplied. The persistent attack of the Allied fleet showed the Turks that their enemies were in earnest in their endeavor to open the straits. Therefore the army on the peninsula was immediately increased in numbers until it is believed to have reached a strength of over 200,000 men, and supplies of all kinds were rushed to them. When the Allies finally landed their army it was too late; the defenders were ready for them. Even in their landing the Allies violated all strategic principles. Instead of coming with an overwhelming force and landing near the neck of the peninsula, where they could interrupt if not destroy the Turkish communications, they landed inadequate numbers near its extremity. Any gains made merely drove the Turks nearer to their base and strengthened their means of resistance. This fatal mistake was not due to the army or navy on the ground, but to the lack of equipment of the expedition which needed water tanks, water carts, hose, pumps, and other means of supplying water and other necessities and, above all, more men. The net loss to the Allies was 100,000 men, six battleships, seven submarines, and many other vessels; also a tremendous loss of prestige, the addition of Bulgaria to the list of their enemies, the loss of Greece and Rumania to their side, the opening of Turkey to supplies of men and munitions from Germany, a vital hampering of Russian operations through the failure to open the straits for their grain and supplies, a

renovation of the Turkish army, Turkish courage, and Turkish determination, the destruction of Serbia, and a prolongation of the war by many months. The only gain was a temporary recall of the Turkish troops sent to invade Egypt. As this expedition was as ill-planned as were the British operations at the Dardanelles, its success was impossible and its recall unimportant.

As already stated, the operations began in February. Several bombardments of the forts were carried out and considerable injury inflicted upon them. The ships, much hampered by bad weather outside, then entered the straits for closer work. On March 18, the British battleships *Ocean* and *Irresistible* and the French battleship *Bouvet* were sunk by mines and the British battle cruiser *Infleable* badly injured by gunfire. The plan of forcing the passage by battleships was then given up and the second phase of the operations soon began. In the meantime the British submarine *AE-2* was sunk in the Sea of Marmora, the *E-15* run ashore and destroyed in the Dardanelles, and the Turkish cruiser *Medjidieh* sunk by a mine near Odessa (she was refloated in May by the Russians). Late in April the British and French troops were landed under fire at the Dardanelles. On May 12, the British battleship *Goliath* was sunk by a Turkish destroyer in a night attack; the battleships *Triumph* and *Majestic* were sunk by submarines a few days later, the former on the 22d, the latter on the 27th. The British submarines were very active at this time in the Black Sea and Sea of Marmora, sinking many vessels, chiefly transports and troopships, but on August 8 they sank the old Turkish battleship *Kheyr-ed-din Barbarossa* and the Turkish gunboat *Berk-i-Satvet*. The commander of one submarine swam ashore and destroyed a bridge on the Turkish line of communications; this was done in the actual presence of the Turkish patrol. In June the German *U-51* was sunk in the Black Sea and the German submarine base at Smyrna destroyed.

About August 1, the French submarine *Mariotte* was sunk. During the summer many British transports and troopships were destroyed by German submarines, the most important being the troopship *Royal Edward*, which was sent to the bottom on August 14 with the loss of 800 lives; but the sinking of the troopships *Ramazan* (Br.) and the *Marquette* (Fr.) were disasters almost equally great.

In the Black Sea the Russians seemed to have been unable to blockade or capture the *Medilla* (ex-Breslau) or the *Hamidieh*. In October the *Sultan Selim Javuz* (ex-*Goeben*) appeared again in the Black Sea but accomplished nothing of importance and seemed to be partly disabled. On November 3, the French submarine *Turquoise* was sunk by gunfire in the Sea of Marmora; on the 5th the British submarine *E-20* was reported missing and *E-7* as sunk. On November 10, the British destroyer *Louis* was sunk.

The Dardanelles operations were now admitted to be a failure, and the British began to transfer their troops to Saloniki. The operations in the Black Sea still continued but by the summer of 1916 had become of no special importance since the Turkish navy had been reduced to impotence. On Oct. 20, 1916, the *Imperatritsa Marie*, a Russian dreadnaught, blew up. In 1917 over 200 Turkish sailing vessels were destroyed by the Russian fleet.



**Cruiser Operations in the Atlantic, Pacific, and Indian Oceans.** At the outbreak of war the only German vessels beyond the reach of home ports were the battle cruiser *Goeben*, the armored cruisers *Scharnhorst* and *Gneisenau*, the fast cruisers *Karlsruhe*, *Breslau*, *Emden*, *Dresden*, *Nürnberg*, *Königsberg*, *Leipzig*, and a number of small cruisers and gunboats. To these were quickly added several fast merchant steamers, the *Kaiser Wilhelm der Grosse*, *Kronprinz Wilhelm*, *Prinz Eitel Friedrich*, *Cap Trafalgar*, and *Spreewald*. These had their armaments on board or in German colonial ports.

The operations of the *Goeben* and *Breslau* are described elsewhere in this article. The *Scharnhorst* and *Gneisenau* were, after the *Goeben*, the most important vessels on the list and were under the command of Vice Admiral Count von Spee, the only German flag officer outside of European waters. After the commencement of hostilities these vessels were first heard of at Tahiti, where they bombarded the port of Papeete and sunk the French gunboat *Zélée*. The *Nürnberg*, after cutting the America-Australia cable at Fanning Island, joined Von Spee's squadron. He then proceeded to the west coast of South America, where he met the *Dresden* and *Leipzig*.

On the afternoon of Nov. 1, 1914, Rear Admiral Sir Christopher Cradock,\* with a squadron consisting of the armored cruisers *Good Hope* (14d-2g9.2, 16g6-23k) and *Monmouth* (10d-14g6-23k), the fast light cruiser *Glasgow* (4.8d-2g6, 10g4-26k), and the armed merchant steamer *Otranto*, was off the Chilean coast searching for German cruisers. The old battleship *Canopus* (13d-4g12-18k) was near at hand and proceeding to a rendezvous to join the squadron. About 4.20 P.M. smoke was seen to the northward and soon afterward Von Spee's squadron, consisting of the *Scharnhorst* (11.4d-8g8.2, 6g5.9-23k), *Gneisenau* (same), unarmored cruisers *Dresden* (3.6d-10g4.1-24k), *Leipzig* (3.2d-10g4.1-23k), and *Nürnberg* (3.4d-10g4.1-24k), was sighted heading south. Cradock seems to have much overestimated the fighting power of his squadron (especially in the heavy sea which was running) or underestimated that of the Germans. At any rate, he sent a wireless message to the *Canopus* at 6.18 saying: "I am going to attack the enemy now," ordered the speed increased to 17 knots, and headed to the southeast, the Germans being between the British and the coast. At 7.03, the enemy opened fire at about 11,500 yards, quickly followed by the British. The superiority of the German ships was at once apparent. The heavy seas made it almost impossible to work the British 6-inch guns on the lower decks (and most of them were on that deck), and one of the *Good Hope*'s 9.2-inch pieces was put out of action very early in the fight. Fires broke out in the forward turrets of the *Good Hope* and *Monmouth* at about the third German salvo, possibly from accumulated ammunition. At 7.50 a tremendous explosion occurred on the *Good Hope* amidships, the flames reaching an altitude of 200 feet. The *Monmouth* was already out of action, down by the head, and leaking badly. The night had become so dark that for some time the Germans aimed at the flames on the doomed vessels, both

of which had ceased firing altogether before 8 o'clock. A rain squall coming up added to the difficulty of pointing the guns, so Von Spee signaled the light cruisers to attack the enemy's ships with torpedoes. The *Good Hope* could not be found and had probably gone down, but the *Nürnberg* discovered the *Monmouth* and, by gunfire at close range, caused her to capsize. In the darkness and thick weather the *Glasgow* and *Otranto* got away without difficulty. As this fight took place in a very rough sea, it is doubtful if the *Good Hope* could use more than four of her sixteen 6-inch guns or the *Monmouth* more than five of her 14. The disabling of one of the 9.2-inch guns of the flagship by a lucky shot hastened the catastrophe.

The result of the action created a profound excitement in Europe, particularly in England, and added much to the prestige of the German navy. The British Admiralty immediately took steps to meet the situation by secretly dispatching a squadron under Vice Admiral Sturdee in pursuit of Von Spee. This consisted of the battle cruisers *Invincible* (17d-8g12-27k), *Inflexible* (same), the armored cruisers *Canarvon* (10.8d-4g7.5, 6g6-23k), *Cornwall* (same as *Monmouth*), *Kent* (same), the fast cruiser *Bristol* (sister to the *Glasgow*), and the *Macedonia* (10-500 tons), supply steamer. At some rendezvous on the South American coast they were joined by the *Canopus* and *Glasgow*. About 8 o'clock on the morning of December 8, while Sturdee was coaling in the adjacent harbors of ports William and Stanley, Falkland Islands, the leading ships of the German squadron were sighted. Knowing nothing of the battle cruisers, the Germans came leisurely on, apparently intent upon destroying the wireless station. At 9.20, they were within 11,000 yards and the *Canopus*, still at anchor, opened fire on them over the lowland. They then turned to the southeast to rejoin the main body which immediately proceeded to the eastward at full speed. At 9.45, the British squadron came out and started in chase. About 1 P.M., the *Invincible* and the *Inflexible* began firing on the rear ships of the German column and a little later were able to reach the armored vessels and leave the others to the cruisers. About 3.30, the *Scharnhorst* changed course about 10 points (112.5 degrees) to starboard, presumably to bring her starboard battery into action, because of injury to her port guns, or to repair damages. At 4.04, she began to list heavily to port and at 4.17, sank with all hands. The *Gneisenau* continued the hopeless fight, though after 5 o'clock she was hors de combat. At 6 P.M., she heeled very suddenly and sank. About 100 survivors were picked up. These state that the ammunition had given out, although by the time it was exhausted over 600 of the complement had been killed or wounded. Of the German light cruisers, the *Leipzig* was sunk by the fire of the *Glasgow* and *Cornwall* about 9 P.M. and the *Nürnberg* by that of the *Kent* at 7.27. Seven officers and 18 men were saved from the two ships; many others lost their lives through being chilled by the coldness of the water. The *Dresden*, which escaped, was discovered off the island of Juan Fernandez on March 14, 1915, by the *Glasgow*, *Kent*, and auxiliary cruiser *Orama*. After an action of five minutes' duration she surrendered, but was on fire and soon afterward blew up. The *Dresden*'s cruise as a commerce destroyer was not very eventful. After

\* Sir Christopher Cradock (1862-1914), born at Hartforth, Yorkshire; served in the Sudan, China, etc.; rear admiral (1910); K.C.V.O. (1912); commander of training squadron (1913); received several awards for saving life; published *Sporting Notes in the Far East* (1889), *Wrinkles in Seamanship* (1894), *Whispers from the Fleet* (1907).

leaving the West Indies she sank the British steamer *Hyades* off Pernambuco about August 22 and the *Holmwood* near Rio de Janeiro, August 29. After her escape from the battle of the Falklands, she sank the *Conway Castle* off Chile on February 27.

Of all the German cruisers the *Emden* (3.6d-10g4.1-24k) had the most spectacular and successful career. On August 1, she left Tsingtao. On the 6th she captured a vessel of the Russian volunteer fleet and sent her into Tsingtao. She then went to the southward. On September 16, the British S.S. *Kabinga* arrived at Calcutta with the crews of 5 others that had been captured and sunk by the *Emden* which was now accompanied by the German auxiliary cruiser *Markomannia* and the Greek collier *Pontoporos*. Several British and French cruisers were at once started after her. On September 16, she coaled in False Bay and on September 18, sank the *Clan Matheson*. On the 22d, she appeared off Madras and shelled and set fire to the oil tanks of the Burma Oil Company. On the 24th, she reached Pondicherry after sinking five more British steamers. On her way around Ceylon, in three days, she sank five British steamers and captured a collier with 7000 tons of Welsh coal. She then went to the Maldive Islands which she left on October 1. She spent the 5th to the 10th at Diego Garcia, Chagos Islands, cleaning her bottom and boilers. Leaving her tenders to proceed to some unknown rendezvous, she went to the vicinity of the Laccadive Islands where she sank five steamers and a dredger, and captured another collier, but sank it also after filling her bunkers. On October 16, her tenders were captured by the British cruiser *Yarmouth*. At early daylight of October 29, with a dummy fourth smokepipe she entered Penang harbor (1700 miles from the Laccadives), her hostile character wholly unsuspected, sank the Russian cruiser *Jemtchug* and a French destroyer, and escaped without injury. On November 9, she approached the Cocos Islands to destroy the wireless station. Before she could effect a landing, the operators signaled her appearance broadcast and the report was picked up by the convoy of some Australian troopships bound to the Suez Canal and not far away. The cruiser *Sydney* (5.4d-8g6-26k) was detached to chase her, and came in sight while the *Emden* was waiting for her landing party. Leaving these men behind, she attempted to escape, but the *Sydney* was faster and carried a heavier battery so that in a short time she was badly injured and forced to run ashore. Of the 361 in her complement, all except 10 officers and 198 men were killed or drowned. Among those saved, fortunately, was her distinguished captain, Commander Karl von Müller, whose conduct throughout the cruise was brave, skillful, and chivalrous. During her remarkable career of 94 days the *Emden* captured or sank 30 vessels, destroyed \$25,000,000 worth of enemy property, almost paralyzed the commerce of the East, and had 19 war vessels of the enemy seeking her.

The *Königsberg* (3.4d-10g4.1-24k) was less successful. After a cruise of two months along the South African coast, in which she destroyed several British merchant ships and the small cruiser *Pegasus*, she was blockaded in the Rufiji River, German East Africa. After several attempts, she was finally destroyed by a British expedition on July 11, 1915.

The *Karlsruhe* (4.8d-12g4.1-27k) operated in

the Atlantic. Up to Oct. 24, 1914, she had captured and destroyed 17 British vessels.

Of the German armed merchant steamers, the *Spreewald* was captured by the armored cruiser *Berwick* on September 12. The *Kaiser Wilhelm der Grosse* had a still shorter career, being sunk on Aug. 7, 1914, by the British cruiser *Highflyer*. On October 14, the *Cap Trafalgar*, which was beginning to interfere with the British trade to South America, was sunk by the British armed steamer *Carmania*, late of the Cunard line. The *Kronprinz Wilhelm* and the *Prinz Eitel Friedrich*, after long and successful cruises as commerce destroyers, entered United States waters and were interned at Norfolk. The *U-53* entered the harbor of Newport, R. I., Oct. 7, 1916, delivered a letter to the German Ambassador and torpedoed 3 British and 2 neutral steamships just outside the 3-mile limit. In Jan., 1917, a raider sank 30 ships worth \$20,000,000 in the South Atlantic. In Aug., the *Seeadler* was wrecked near the Fiji Islands after sinking several ships.

Immediately after war was declared, the Entente Allies began perfecting arrangements for the capture of German colonies. On Aug. 7, Togoland was seized by land forces. On Aug. 27, Japan declared a blockade of Kiaochow, and on Nov. 7, Tsingtao, the German stronghold in China, surrendered to the Allied forces—chiefly Japanese. Early in August, a New Zealand expedition sailed for Samoa. At Noumea, the convoy—which was a weak one—became strengthened by the battle cruiser *Australia* (19d-8g12-27k) and the cruiser *Melbourne* (9.5d-2g7.6, 8g6.4-21k). The expedition arrived at Apia on August 30 and the German Governor surrendered at once as he had practically no means of resistance. On its return from Samoa, the Australian squadron captured Herbertshöhe, the capital of the Bismarck Archipelago, and, on September 27, took possession of the town of Friedrich Wilhelm in Kaiser Wilhelm's Land (German New Guinea). During September and October, Australian and Japanese expeditions seized the remaining German possessions in the Ladrone, Marshall, and Caroline Islands.

For a discussion of blockade and the submarine warfare against noncombatants, see the section in this article headed NEUTRAL NATIONS.

**Naval Strategy of the War.** There is much reason to believe that Germany strongly hoped for the continued neutrality of Great Britain and her original naval plans are said to have been based on this supposition. The High Seas fleet was off the coast of Norway, leaving behind it in the Baltic a sufficient force to hold the Russian navy in check. Had England not entered the war, the High Seas fleet would have proceeded to the west coast of France, defeated the inferior French fleet, and established a base for the landing of an army of large size in the French rear. The advent of England changed all this. The High Seas fleet was withdrawn to the Kaiser Wilhelm Canal and a submarine warfare begun. With this, it was hoped to reduce the British forces to a size that would render victory possible. But the British battle fleet kept behind defenses that were submarine proof and instituted a blockade and antisubmarine warfare by means of unimportant vessels. Raids in force on the British coast only served to bring into view the battle-cruiser squadron and its speed and skillful handling prevented sub-



marines from scoring. In the meantime, the British were building battleships, cruisers, and submarines at a rate of speed that the Germans could not equal. After six months, during which the naval conditions were becoming less and less favorable to Germany, submarine warfare against British commerce was commenced, but this failed seriously to check British trade and was almost as costly to Germany as to her enemies. The Mediterranean field was then exploited as affording a better chance to avoid antisubmarine warfare and giving some support to the Balkan and Asiatic operations; but this transfer of submarine activity did not seriously hamper the Entente Allies or facilitate their own work.

The total effect of the German naval strategy upon the conduct of the war therefore was small and that strategy may be regarded as a failure. Should England strip herself of effective troops too closely at any time, an invasion might be attempted as a last resort. A preliminary success would add to the invading army all the German prisoners in England and they would only need arms and ammunition to create a serious condition of affairs. To secure such a result, the sacrifice of the German fleet might not be too great.

The main principles of British naval strategy appeared to be: (a) to hold the German fleet blockaded and be prepared at all times to give battle and bring into action forces superior to any which may have to be met; (b) to protect the British coast against an invasion in force; (c) to effect a commercial blockade (not declared) of Germany and prevent the importation of supplies of any kind or the exportation of wares, which could be sold for cash or exchanged for a desirable equivalent; (d) to protect British trade and destroy all German cruisers or other vessels that might interfere with it; (e) to facilitate and assist in the military operations of the Entente Allies and hamper those of the enemy.

The tactical operations occasionally failed but the strategical objectives were attained except in the case of the Dardanelles. The mistakes made in this dismal failure are elsewhere considered. See *Operations in the Black Sea and Dardanelles*.

**Some Naval Lessons of the War. Submarines.**—The exact value of the submarine as a weapon of war is not yet determined though it is unquestionably great. It is certainly an antagonist to be feared by all surface ships, but it is by no means so dangerous as many once thought it. Its most serious weakness is its vulnerability. If rammed with much force or struck by a single small shell it will sink, but double hulls and submerged water-tight decks may, in future large boats, greatly improve their ability to stand punishment. While it is being improved and rendered more effective and dangerous, so are its foes. The most important of these are the destroyer and the aeroplane; but under certain conditions the wire (in many cases, tubing) net and the swift motor boat are most efficient. As the immediate cause of destruction of submarines the destroyer ranks first, but the aeroplane can sight a submarine when too deeply immersed to show her periscope and thus warn surface vessels of her exact locality; in several instances during the war, aeroplanes sunk submarines by dropping bombs on them. Among the important qualities

of the submarine are its suitability for secret scouting, its capacity for defense against a close blockade, and its availability for protecting surface ships against the enemy's submarines.

**Battleships and Battle Cruisers.**—Battleships have had as yet no proper test in the war. Battle cruisers are in great favor and are found to be of inestimable value in many ways, but they are not able to stand very much punishment.

**Torpedo.**—The German short-range torpedo, with its enormous bursting charge, is a very deadly weapon, rarely failing to sink the enemy. Long-range torpedoes of the future are likely to be larger than existing types and have heavier bursting charges. Against the disruptive effect of so great an amount of explosive no method of subdivision of hull is adequate and some other means must be devised if surface battleships are to continue in use. On some of their old cruisers the British built external coffer dams along the sides. These greatly reduce the speed and their efficiency against torpedoes was not tested so far as known.

**Old Battleships and Cruisers.**—All the belligerent navies have found much use for old ships that were no longer fit for their designed purposes. In future, such craft are likely to be retained much longer than was hitherto considered desirable.

**Monitors.**—As a support to military operations, light-draft monitors have proved to be valuable. Their low speed in connection with small draft renders possible adequate hull protection against torpedoes, and their draft enables them to get close in shore where the ordinary battleship could not operate.

**Light Cruisers** are all now fitted with thin armor belts at the water line and the value of this is said to have been demonstrated, especially when scouting against destroyers. The necessity of the highest practicable speed is unquestionable and the battery, instead of many small guns, should consist of a less number of larger ones.

**Bombardment of Forts.**—The futility of bombarding forts with ships, unless an adequate landing force is available to take advantage of the work of the ship's guns, has been conclusively shown in the past and received another convincing proof at the Dardanelles.

**Air Craft.**—The value of air craft as scouts for their fleet was clearly demonstrated, and further important uses indicated, though as yet untried. As detectors of submarines, aeroplanes are invaluable adjuncts to a fleet. Airships are also valuable, but as constructed at present, large ones can only operate from a base on shore. See section on **AÉRIAL OPERATIONS**.

**Big Guns and High Angle of Elevation.**—Perhaps the most definite of the lessons of the war was the dominance of the big gun. Its greater range and destructive power gave the victory in every instance at sea in which the fight lasted to a finish. But, in the battle off the Falklands, the high elevation which it was possible to give the German 8.2-inch guns enabled them to open fire almost as soon as the 12-inch pieces of their opponents; and, in the battles in the North Sea, the advantage of high angle of elevation was again noted.

#### V. AÉRIAL OPERATIONS

The outbreak of the war found the Great Powers of Europe ready and anxious to make

immediate application of aeronautics to their respective military and naval operations. That all were inadequately prepared on the score of equipment and trained personnel the opening weeks of the war soon showed, and early the demands likely to be made on the aerial services were clearly indicated. But in no field did developments follow more rapidly, and as early as the Germans undertook the invasion of Belgium and France it was realized that aeroplane and airship had worked materially to change the nature and scope of military operations and to render obsolete tactics and movements that long had prevailed in warfare. By affording to scouts and intelligence officers a complete view of the enemy's territory, the disposition and movement of his troops and fleets, and his permanent or even his most temporary defenses, surprise or flanking movements were rendered practically impossible. With both sides adequately informed as to the forces of their adversaries through constant aerial scouting and reconnaissance, the tendency towards trench fighting and the protracted sieges and bombardments of the western front was as pronounced as it was inevitable. The direction and control of fire from an observation or kite balloon or aeroplane early became an indispensable feature of the work of the artillery. The tactical changes wrought by the use of air craft were stupendous, and the service of security and information by aerial observers and range finding for the artillery became essential features of the everyday work of the forces in the field. In addition there were raids by aeroplane and airship to drop explosive or incendiary bombs on fortified positions, moving columns, railway trains, supply depots or munitions works, or on warships, submarines, and transports.

Such activities on the part of the airmen soon became so valuable in a military sense that the prevention of these efforts was essential, and this naturally led to the development of the purely combative side of aerial warfare, which soon passed from individual duels in the air to savage actions often at close range participated in by a number of aeroplanes of different types, where battle tactics of an elementary form were evolved as a result of training and drill to secure harmony of action.

Naturally this led to increased armament and armoring of the aeroplanes, and the calibre of the rapid-fire gun that soon took the place of the automatic pistol became greater, so that by 1916 an air battle was indeed a serious matter, and the protection of fuel tanks and machinery and the design of machines to withstand as much penetration of the wings as possible figured prominently, as indeed did the entire question of design and construction for power, carrying capacity, speed, ease of manoeuvring, and general reliability. Remarkable advances were realized, along with wholesale demands which taxed the facilities for manufacture in the belligerent nations as well as in America.

Flying corps existing in armies and navies were on the outbreak of the war greatly augmented and preparations made to train vast numbers of aviators. It was estimated that the various belligerent nations on the outbreak of the war possessed about 5000 aeroplanes and 109 dirigibles. Naturally Germany, where some 12 Zeppelins and about 23 Parseval and Gross airships and about 1000 aeroplanes were avail-

able at the beginning of the war, was preëminent as regards numbers and trained pilots and observers; but here the policy of standardization and organization contributing so much to her efficiency in other fields was not of corresponding avail. A year's service, even less, demonstrated that much of the equipment so carefully assembled and standardized soon became obsolete and inferior with respect to the rapid developments that war conditions were bringing out for the Allies.

While the Germans had trained men in their aviation corps the French, with perhaps some 31 airships of nonrigid or semirigid types and possibly 1200 military aeroplanes of different design, had fewer enrolled aviators at the outbreak of the war in actual service, but had a large number of expert civilians and their machines to call upon, so that soon there was organized a body of men whose equipment, both available and rapidly supplied, represented the note of progress ever peculiar to the French in this field. The organization and drill of the various units was done with remarkable military skill and care.

Great Britain, distinctly inferior in organization and equipment as well as numbers, for its aeroplanes hardly totaled 500, and its dirigibles but 15, at the beginning of the war endeavored speedily to repair these deficiencies, and while the defensive efforts to repel the Zeppelin raids were crowned with but moderate success, British aviators at the front and at sea achieved a good record. Russia with 16 small airships and perhaps 800 aeroplanes, many of which were in poor shape, suffered from an inadequacy of equipment, while in Austria and Italy from the outset aerial war was waged by both Powers with a fair degree of preparation.

Aerial activity in war became not only important but indispensable under modern conditions, yet it did not have a direct and primary effect on the progress of the war itself comparable, let us say, to the activity of the submarine. Indirectly the influence of air craft on warfare proved enormous, but two years of experience indicated that there was but little direct military advantage in the attempts at wholesale destruction of noncombatants, buildings, and material by aeroplane and dirigible, although in the summer of 1916 the discharge of high explosives on the German trenches aided considerably the attacks of the Allies. The numerous air raids over Great Britain resulted in little positive military advantage, and the "frightfulness" that they were to inspire soon gave way to a feeling of intense irritation on the part of the invaded. That they were solely for the purpose of destruction by way of reprisal or otherwise was not believed by many military and naval authorities, even British, who urged that the raids were a part of an elaborate and highly developed system of reconnaissance carried on in connection with naval operations, especially by submarines and raiding cruisers, with whom they were in communication through wireless. Nevertheless these raids were of special significance, as they indicated future possibilities in the way of invasion and a menace that was ever at hand, and naturally they bulk large in any history of the war. Accordingly it may be desirable to consider some of the more effective raids on the great cities and at considerable distances from home bases.

Early in the war various places were attacked

with bombs dropped from aëroplanes and dirigibles, and naturally such incidents aroused widespread interest for their novelty. At first some pretense was made to comply with Article 25, Annex to Hague Convention, Oct. 19, 1907, which declared "The attack or bombardment, by whatever means, of towns, villages, dwellings, or buildings which are undefended, is prohibited." The addition of the words "by whatever means" was for the purpose of making it clear that the bombardment of these undefended places from balloons or aëroplanes was prohibited. This rule was ratified without reservations among other countries by Belgium, France, and Great Britain, as well as the United States, and with reservations by Germany, Russia, and Austria. The declaration (Oct. 18, 1907) to prohibit "for a period extending to the close of the Third Peace Conference the discharge of projectiles and explosives from balloons or by other new methods of a similar nature" was ratified among other nations by Great Britain, Belgium, and the United States. Germany, France, Austria, and Russia refused to ratify. See *INTERNATIONAL LAW, International Law in War*.

It was claimed that cities like Paris and London were in reality fortified camps, or equivalent thereto, and as such were liable to attack without warning; while if civilians were killed when towns supposed to contain supply stations, railway centres, palaces, or headquarters were bombed the injuries were to be considered incidental rather than intended. The raid of the Allies on Freiberg, e.g., which was said to be unfortified, was considered by the Germans an act in violation of the rules of war and led to reprisals. The bombing of hospitals and buildings protected by Red Cross flags figured also in the charges and recriminations that these aërial attacks provoked.

In the early weeks of the war a Zeppelin dropped bombs over Antwerp, and at the end of August and on September 1, 2, and 3, 1914, Taube monoplanes made daily visits to Paris, where, as in London, all street and other lights were extinguished and means hastily improvised to defend the city by searchlight and anti-aircraft guns as well as to organize special fire-fighting facilities to deal with the results of incendiary bombs. On Oct. 11, 1914, another raid was made on Paris and bombs were dropped, some of which fell on the cathedral of Notre Dame, while others damaged streets, sewers, and the underground railway, besides causing the deaths of some three persons and injuries to 14. In the meantime the aërial defense of the city was being developed, but on March 22, 1915, another raid was made on Paris, which, while resulting in little damage, nevertheless emphasized the need of a more complete system of defense. This was organized under General Hirschauer, former chief of the aëronautical department, and after it had been developed Paris was free from attack for many months. There was a system of central control with the battle front, aviation parks, and other stations connected by telephone, and frequent anti-aircraft batteries, many mounted on high-speed motors, not to mention searchlight and observing stations equipped with microphonic detectors, were provided at carefully chosen points. There were a number of completely equipped aëroplane stations each ready to send aloft its complement of machines at a moment's notice. A patrol was maintained with the aëroplanes flying at

different levels, drilled to intercept a hostile machine from both above and below.

Naturally an air attack on the British Isles was the goal aimed at by the Germans. Various reconnoissances were made by the Germans in connection with the flights on the western front and the observation of the British navy, but it was not until Dec. 5, 1914, that the reporting of a German aëroplane over Dover brought home to the British the reality of aërial danger. On December 24, bombs were dropped on Dover, and the following day a German biplane dropping bombs near Chatham was engaged by three British machines and was driven down the Thames, presumably to its destruction, as later the body of a German aviator was found near the river mouth. But the first serious raid on Britain was on the evening of Jan. 19, 1915, and was directed against Yarmouth, Sandringham, and other points on the Norfolk coast. This raid evidently was designed to test the capabilities of the Zeppelins for extended service, yet even at the time it was thought by English naval critics to be for the purpose of securing information as to the British fleet and for possible bomb dropping on shipyards and ironworks. This raid was but a beginning, for by June 1, 1914, the metropolitan section of London was reached and considerable damage was done, four lives being lost, while on June 6 another raid attended by casualties was made on the east coast of England, and again on June 15, on this last 16 persons being killed and 40 injured. Little of this nature then happened, save for a raid on Harwich, until Aug. 9, 1915, when a raid in considerable force was made, and bombs were dropped on warships in the Thames, on London docks, on torpedo boats near Harwich, and on military posts on the Humber. This raid was the forerunner of the activity promised by Count Zeppelin in the previous spring, when he stated that by the following August there would be available 15 airships of a new type. The casualties of this raid, on which some five airships started, were stated at 25, about half of which were deaths, while a number of fires were set.

Following this raid came one on the night of August 12 against Harwich, where 6 were killed and 17 wounded, while a squadron of 4 Zeppelins in another raid over the English east coast killed 10 and wounded 36 besides damaging various houses and other buildings. This was the eighteenth raid on Great Britain, making a total of 85 killed and 267 injured by bombs. The attacks of the Zeppelins reached perhaps a climax on September 8-9 when the heart of London was reached, and the Zeppelins flying over Trafalgar Square were distinctly visible from the street. The casualties of this raid were given as 20 killed, 14 seriously injured, and 74 slightly wounded, while the material damage was considerable. These raids continued during September over parts of the eastern counties. On October 13-14 London was again attacked by Zeppelins, which, fearful of searchlight and gunfire, flew very high with a corresponding effect on the accuracy of their bomb dropping. The roll of casualties included 46 killed and 114 wounded. For a few months now there was a lull in the aërial attacks on Great Britain, but the most serious raid came on the night of Jan. 31, 1915, when six or seven Zeppelins passed over the midland counties, dropping over 300 bombs and generally

terrorizing the inhabitants, the aim being to strike a blow at the industrial centres. Here 61 were killed and 101 injured, and the total number of the killed for 29 raids since the beginning of the war was 266. Beginning March 31, 1916, air raids were made over Great Britain for five successive nights and not only the eastern counties but even Scotland and the northeast coast were visited and bombs dropped. In one of these raids the Zeppelin *L-15* suffering severely from gunfire was forced to descend and was captured by the British.

The aerial defense of Great Britain came in for considerable criticism both within and without Parliament and unfavorable comparison with that maintained in France was made, but there were fundamental differences in the nature of the problem. Paris was behind a carefully guarded military frontier and all approaches were by land, while Great Britain, surrounded by water and often enveloped in fog, presented a much better opportunity for attack given an aeroplane or airship that could maintain itself in air long enough for a sustained flight. Many Englishmen urged that too much had been done for defense and not enough in the way of offensive movements against the Zeppelins in their home ports and stations.

Such raids as those described stand out apart from their actual military significance, but they must not be allowed to eclipse the daily routine and the ever-increasing number of frequent combats on all the battle fronts of this great war. What was remarkable at the beginning of the war, such as visits of the German Taubes to Paris in August, 1914, or the bomb dropping by a Zeppelin on Antwerp on September 1, of the same year, soon became commonplace as did the bombing of the German hangars at Düsseldorf and Cologne by the Allies later in the month. Attacks on Friedrichshafen by the British and on Freiberg by the French followed, while a British raid on Cuxhaven on Dec. 25, 1914, was an early example of a number of aeroplanes working together. Aerial attacks and reconnoissances in force became more frequent, ever on a larger scale and with greater elaboration of organization as well as with more powerful and more heavily armed machines. To deprive the enemy of the services of aviators and machines and to prevent their use for purposes of advantage now became a prime military necessity with a direct bearing on operations. Patrols were maintained more effectively, the service of security and information carried on daily in spite of hostile interference, while for the gunners in and behind the trenches ranges and directions were observed in the unprecedented bombardments that took place from time to time. Bombing raids by aeroplanes were organized on a large scale by the French especially with their heavier machines and many of these were very successful. While both sides continually lost many aeroplanes in actual fighting, the Germans suffered severely with respect to their Zeppelins by accident as well as by gun fire. The first Zeppelin to succumb as the result of aeroplane attack was on June 7, 1915, when a Canadian aviator, Sublieut. R. A. J. Warneford, R.N., in a Morane monoplane encountered the German airship *LZ-38* flying at a height of about 6000 feet between Ghent and Brussels. Getting directly above the Zeppelin he was able to land a bomb squarely on the envelope so that the resulting explosion entirely destroyed the

dirigible. There were further accidents to the German Zeppelins during the autumn and early winter of 1915, the Russians destroying an airship by artillery fire near Kalkun on the Libau-Benin Railway on December 5. Another notable achievement was the bringing down of the German naval Zeppelin *LZ-77* by an incendiary shell from a 77-mm. anti-aircraft gun of a French motor section at Brabant-le-Roi on Feb. 21, 1916. The shell ignited the gas bag. On May 3 the naval Zeppelin *L-20* was forced to descend on the Norwegian coast where it was blown up to preserve neutrality, while on May 5 one Zeppelin was destroyed by gunfire from French warships over Saloniki and another by the British off the coast of Schleswig-Holstein.

Along with the brilliant feats of individual aviators there was developed a tendency towards tactical formations and the use of many machines. In August, 1915, at one occasion 84 French aeroplanes were assembled for flight over the German lines, difference in speed and armament making possible tactical dispositions of the greatest advantage. The Germans for a time had some machines of superior armament and from August, 1915, heavier guns and armored aeroplanes figured and operations by flotillas became more general, these including the use of powerful bombing machines accompanied by armored scouts for their protection and swift flying machines for advanced reconnoitring. Air craft were also used at sea against warships and transports and in August, 1915, the Russians employed seaplanes against a German gunboat near Windau accompanied also by a Zeppelin and two seaplanes. Aeroplanes were also in evidence in the south and east, for the Russians attacked Constantinople in August dropping bombs on the harbor forts and from this time both sides were in active aerial warfare until the close of the Dardanelles campaign. On August 10 the Russians brought seaplanes to bear in repelling the landing of German troops off the Gulf of Riga.

Everywhere there was aerial activity and damage wrought by air craft, yet unavoidably this was accompanied by wholesale destruction of machines and losses of aviators. As samples of aerial attacks, and in fact but little more here can be attempted, mention may be made of the bombing of a poison gas plant at Dornach on Aug. 26, 1915, by a French aviator and a bomb attack on the royal palace at Stuttgart, a step it was announced taken in retaliation for German bomb dropping on unfortified towns and civilians. In every kind of operations air craft aided as at the battle in the attack on Artois Sept. 25, 1915, when the British airmen were prominent, and later at Verdun in the spring of 1916. On the western front in April, 1916, French airmen brought down 31 hostile aeroplanes. On October 3, a group of 19 French aeroplanes essayed an attack on Luxemburg, where the Kaiser had established headquarters.

In the south, Austrians were active against Italy, and bombing raids were made against Brescia, Verona, Venice, Udine, and other points, while the Italians in turn made attacks on Austrian territory. On Nov. 28, 1915, occurred the first battle between British and German seaplanes near Dunkirk with damages to both sides, while on November 29 a British seaplane destroyed a German submarine off the Belgian coast.

Typical of a day's work for the airmen may

be mentioned the British War Office report of Dec. 19, 1915, which announced 44 combats in the air on the western front. In April, 1916, French airmen on the western front brought down 31 hostile aeroplanes, while in the struggle around Verdun aeroplanes of both sides were in constant service. In the great drive of June and July, 1916, the Allies' aeroplanes participated actively, and reports made mention of extraordinary effects attending the dropping of powerful explosives on the trenches. The aeroplanes also made many raids in the rear. Airmen mostly French were active with the eastern army in the Balkans where the intense cold put many difficulties in their way. Around the Suez Canal the aeroplanes were invaluable in supplying information of threatened movements.

In 1916 everywhere there was increased aerial activity, a more active patrol service was maintained, and actions were frequent and serious. At sea aeroplanes were searching out for submarines and scouting, and employment of airship and aeroplane before and in a large naval battle for scouting and reconnaissance in a manner and on a scale somewhat corresponding to their use on land found a notable opportunity in the great fight off Jutland on May 31, 1916.

The year, 1917, marked the ever-increasing importance of the aeroplane as a military asset. It has been called the eyes of the army and has lived up to this name more and more as the great battles of the year were fought. In the battle of the Somme and during the great German retreat General Haig depended on his air service to find out just what the Germans were doing and how far they had retreated. It appears, however, that the Germans began their movement without being discovered by the British. We find the aeroplane probably used to its greatest advantage in the spring and summer campaigns on the Italian front and during their retreat to the Piave. Fleets of 150 or more machines would fly low to the ground and drop bombs on forming troops, lines of communications, and munition dumps, or they would rake the enemy with machine gun fire. Some of the giant Caproni planes could carry without any difficulty 10 or more men. One of the interesting outgrowths of increased aerial activity was the development of the "camouflage" system. This means the covering of trenches, artillery and other things of military value with trees, painted scenes etc., so that they could not be distinguished from the rest of the landscape from the air. These were of particularly great value inasmuch as airplanes were compelled to stay 2 or 3 miles in the air as anti-aircraft guns were improved.

England was the scene of many airship and aeroplane raids during 1917. The first one occurred on the night of March 16-17. The last one previous to this occurred in November, 1916. The southeastern counties were attacked with comparatively little material damage and no military damage whatever. On their return to home soil one Zeppelin was brought down near Compiègne by French anti-aircraft guns. The crew of 30 was killed. On May 7 German airplanes dropped bombs northeast of London without doing any damage. On the same day the Zeppelin L-22 was brought down in the North Sea by a British naval plane.

Between May 23 and June 16, 1917, five aerial attacks were made on England. In almost all of these the Germans used aeroplanes instead

of Zeppelins. In one attack on May 25, 76 men, women, and children were killed and 174 wounded. Three of the planes were shot down as they were homeward bound across the channel. Twenty German planes took part in the attack. On June 5, 16 planes bombarded the coast towns in Kent and Essex. Two more were shot down. They were unable to penetrate the outer defenses of London. The worst raid of the month was on June 13. It was carried out in broad daylight and resulted in the death of 97 persons, of whom 26 were school children, and the wounding of 437. On June 16 two Zeppelins bombarded the Kentish coast and killed 2 and wounded 16. One of them was brought down in flames on British soil and the entire crew was killed.

On July 4 another great raid was made on England. Eleven persons were killed and 36 injured at Harwich. Two German machines were lost. London was again attacked by a fleet of 20 airplanes which penetrated all the defenses. Thirty-seven people were killed and 141 injured but the British Admiralty announced that while the material damage was heavy the military damage was practically nothing. Eleven persons were killed and 26 wounded when two German aeroplanes dropped bombs on Felixstone and Harwich on July 22. The Essex coast was raided on August 12 with a loss of 23 lives and 50 injured. Two hostile machines were destroyed. On August 22 Yorkshire, Dover, Ramsgate, and Margate were raided during which 11 were killed and 13 injured. The Germans suffered heavily in this raid, losing 8 Gotha machines. On September 3 bombs were dropped on the naval station at Chatham, killing 108 and wounding 92. On the moonlight night of September 4, 11 were killed and 62 hurt in a raid on London.

Raids were made by German airmen on England on September 24, 25, 29, 30, and October 1. As a result of these 52 were killed and 216 injured. The Germans carried them out with scarcely any loss to themselves, British reports only claiming to have destroyed two machines. One of the most disastrous raids from the German point of view was made on the night of Oct. 19, 1917. At least 11 Zeppelins participated and on their way home, five were lost in French territory. One was captured undamaged at Bourbonne-les-Bains. Twenty-seven were killed and 53 wounded as a result of this raid. On October 31, 30 aeroplanes attacked London but only three got through the defenses. Eight were killed and 21 injured. On December 6, 25 Gotha planes attacked London, killing 10 and injuring 31. On December 18, 20 aeroplanes raided Kent, Essex, and London and killed 10 and wounded 70. In these last two raids, three planes were forced to descend, and their crews were taken prisoners. A careful compilation of British government reports show that from the beginning of the war to Jan. 1, 1918, 616 persons had been killed and 1630 wounded.

The consensus of opinion among the Allied nations was that these raids were of no military value and were merely another form of Germany's "frightfulness." Public opinion in England and France demanded reprisals, but for physical reasons the governments refused to heed the popular clamor. Instead they gave their attention to the aerial bombardment of purely military centres such as the submarine bases at Ostend and Zeebrugge and the Krupp

works at Essen. France made one or two spasmodic attempts to retaliate by bombarding towns in Alsace and Lorraine, but they met with little success.

It would be impossible in a work of this kind to attempt to describe the engagements in the air over the battlefronts. Hundreds of them occurred every week and few of them stood out more than others for daring, success, etc. So far a method of tactical warfare had not been evolved by either of the belligerent sides. The engagements were mostly individual, even when the machines travelled in groups. To give an idea of the *aéroplane's* activities, it was officially reported that on the western front alone 717 machines were brought or driven down in April, 1917, 713 in May, 467 in July, and 704 in September. Accurate figures are not available for the losses on the other fronts.

With the entrance of the United States into the war it was felt that as soon as her resources were available the supremacy of the air would pass once and for all to the Entente Allies. She devised the standardized "Liberty Motor" which was supposed to contain the best points of all the foreign *aéroplanes* in one engine.

The verdict of three years' use of *aéroplanes* and airships confirmed in the main previous theory and prediction. The *aéroplane* demonstrated itself an important and essential element of modern warfare both on land and sea. The airship, which in the hands of the Germans increased vastly in efficiency as the war progressed and was found valuable for oversea scouting and reconnaissance and bomb dropping, may cause damage, serious and costly; but that it contributed anything worth while to the settlement of the war or greatly affected its progress or outcome was not proven by three years of use in 1914-17. As regards relative technical or military advantage by January, 1918, it was more difficult to say. The *aërial* services of the Allies in organization and extent had developed to a greater degree than those of the Teutonic Powers and had become more efficient with ever-improved machines and heavier armament, but throughout the war German and Austrian aviators fought most valiantly, and the limited success achieved by the Zeppelins was due to their inherent nature rather than to unskillful operation. See **AËRONAUTICS; HANGAR; MILITARY AËRONAUTICS; NAVAL AËRONAUTICS.**

#### VI. ALLEGED ATROCITIES

**Belgium.** Shortly after the occupation of Belgium by the Germans, reports reached the outside world of shocking atrocities alleged to have been committed by the German army during the invasion. To ascertain, if possible, the truth of these reports, the government of Great Britain appointed a commission of prominent English statesmen and jurists headed by Viscount Bryce to investigate the matter. Depositions of more than 1200 persons were considered by the commission. From the evidence accumulated the commission reached the following conclusions:

1. That there were in many parts of Belgium deliberate and systematically organized massacres of the civil population, accompanied by many isolated murders and other outrages.

2. That innocent men, women, and children in large numbers were murdered and women violated.

3. That looting, house burning, and wanton destruction of property were ordered and countenanced by the officers of the German army.

4. That women and children were used as a shield for advancing military forces.

In answer to these charges the German government issued a memorandum specifying the acts of civilians in Belgium, in violation of the rules of war, such as shooting at German soldiers from private houses, and mutilating wounded Germans, which, they claimed, justified the German military authorities in their acts of reprisal.

Great resentment was aroused in England by the action of the German military authorities in executing Miss Edith Cavell,\* an English nurse who was accused of utilizing her position to assist in the escape of Belgian, French, and British soldiers from Belgium.

Another incident which caused considerable adverse criticism of the German government was the case of Cardinal Mercier (q.v.), Archbishop of Malines and Roman Catholic Primate of Belgium. After a trip through the devastated parts of Belgium he wrote a pastoral letter describing the conditions which he had found. In passionate words he set forth the evidence of ruined villages, churches, schools, and monasteries destroyed. Efforts were made by the German authorities to suppress the letter, and the Cardinal was put under restraint, although not actually imprisoned by the German Governor of Belgium, Von Bissing.† In answer to a protest made by the Pope the German authorities stated that all restraints upon the Cardinal's freedom of communication with the clergy had been removed.

**Armenia.** The governments of France, Russia, and Great Britain issued the following joint note on May 23, 1915. "For the past months Kurds and the Turkish population of Armenia have been engaged in massacring Armenians with the help of the Ottoman authorities. Such massacres took place about the middle of April at Erzerum, Dertshau, Moush, Zeitun, and in all Cilicia. The inhabitants of about 100 villages near Van were all assassinated. In the town itself the Armenian quarter is besieged by Kurds." The preaching of a holy war soon after this increased the massacres to such an extent that the Armenian paper *Mshak* estimated that only 200,000 of the race still remained in the country, out of a total of 1,200,000 at the beginning of the war, and that 850,000 had been killed or enslaved by the Turks and 200,000 had migrated to Russia. The United States placed an informal request before the German Ambassador, asking that the German government attempt to alleviate the conditions of the Armenians. An informal reply said that the Armenian reports were greatly exaggerated. Charges of barbarous cruelty were laid before the Sublime Porte by the American Ambassador, Morgenthau. Turkey filed counter charges at Washington, stating that Russian troops, aided by Greeks and Armenians, had committed acts

\* Edith Cavell was head of a nurses' training school in Brussels; as a nurse did much for German as well as Allied soldiers in European War. The American Minister, Brand Whitlock, made every effort to have her life spared. The execution roused England and France and was commented on throughout the United States. A notable memorial service was held at St. Paul's, London, and a statue of Miss Cavell by Sir George Frampton was to be erected adjoining Trafalgar Square.

† Moritz Ferdinand, Baron von Bissing, born (1844) at Bellmansdorf; rose to be lieutenant general (1897) and general of cavalry, commanding the Seventh Army Corps; after invasion of Belgium by the Germans was appointed Military Governor of the country.



of cruelty against Moslems in the Caucasus region, and that continual revolutions incited by the Allies were occurring in Armenia.

**Poland.** At the outbreak of the war Germany, Austria, and Russia attempted to gain the loyal support of the entire Polish nation by promises of the reestablishment of the old Polish Kingdom. Poles fought against each other in the hopes that a united Poland would result. In the great German drive into eastern Russia Poland was crushed and the inhabitants suffered untold hardships. As the Russians retreated they compelled the Poles to abandon their homes for military reasons. Any villages that escaped the Russians were almost invariably destroyed by the Germans. It is estimated that at least 20,000 villages were wiped out and that over 200 towns were completely destroyed. In the Gorlice district the Polish Relief Victims' Fund estimate that during the 18 months' campaign 1,500,000 noncombatants, caught between the contending armies, perished from hunger and disease. The Rockefeller Foundation reported that the entire civilian population faced a famine. The poorer classes were found to be existing in many cases on meatless soup and a crust of bread. There was no fuel to be had and many were frozen to death during the winter of 1915-16. Attempts were made to feed the Polish sufferers through an American committee, but Germany and Great Britain could not agree as to method.

**Serbia.** The conditions in Serbia were practically similar to those in Poland. Villages and towns were wiped out in the face of the German drive through the Balkans. After the first drive of the Austrians into Serbia fever epidemics broke out all over the country. It is presumed to have been caused by the congestion of all the rural population in the urban districts as a result of the war. Hundreds died daily, and in many places it was impossible to bury all the victims. Physicians were sent to Serbia by the Allies and hospital units were made up in the United States and sent over. Cholera also broke out among the noncombatants after the German drive. It was caused by the shortage of food and the bad sanitary conditions, the people being forced to herd together and to live in the open. It is estimated that over 600,000 noncombatants died as a result of the plague and from hunger.

#### VII. DESTRUCTION OF ART AND ARCHITECTURE

The great war saw the destruction or mutilation of many of the landmarks of Europe in the field of art and architecture. Charges and countercharges were made by the belligerents of deliberate attempts to destroy these. The destruction of a large part of the city of Louvain, including its church of St. Pierre, the University of Louvain (q.v.), and its library of rare books and manuscripts aroused much feeling in all civilized countries. In defense of its action the German general staff issued an official communication in which it was stated that the civilian population, after the surrender of the city to the Germans, had fired upon German soldiers from private houses, as a result of which five officers were wounded. It was also claimed that the Belgian authorities had encouraged a general uprising of the civilian population against the Germans. The case of Louvain figured largely in the American press, but it was only one of nu-

merous similar instances where towns and villages containing gems of art and architecture had been burned and many of their inhabitants shot because they had resisted invaders.

The beautiful cathedral of Rheims (q.v.), dating from the thirteenth century, suffered irreparable damage from repeated German bombardments. The Germans, in explanation of the first bombardment, maintained that the French had established an observation post in its tower. It is doubtful if the exquisite carvings, statuary, and stained glass windows can ever be replaced. Another city to suffer was Ypres (q.v.). Its famous Cloth Hall was seriously damaged during the heavy bombardments of the Flanders campaign.

There was constant danger to architecture of historical interest from the frequent aerial attacks on cities. For example, during an Austrian raid on Venice bombs fell on the Scalzi Church. The ceiling, which was ornamented with beautiful sculpture of Tiepolo, was crushed. Historic landmarks of London and Paris narrowly escaped damage from Zeppelin raids.

#### VIII. NEUTRAL NATIONS

A war involving all of the great industrial nations of Europe was certain to have far-reaching effects upon all neutral nations. The complete dislocation of international trade and the closing of all the great stock markets of the world gave rise to financial and economic problems which were absolutely unprecedented. After the first shock the business interests gradually adjusted themselves to the new conditions. But soon it became apparent that problems far more serious than those produced by the temporary disturbance caused by the outbreak of the war, confronted the neutral nations. To the questions of neutral trade, contraband and blockade, which had arisen in previous wars, there were added new and more vexing problems due to the introduction of new methods of warfare, especially the operation of the submarines.

**United States.** As the largest and most important of the neutral Powers, the United States was sure to be vitally affected. This country was looked to by the smaller neutral nations to champion the interests of all neutrals. Moreover, it was certain that the United States would be called upon to furnish large quantities of supplies to the belligerent Powers. Each of the belligerents would be anxious to avail themselves of this source of supply, and each in turn would strive to prevent their opponents taking advantage of it. Under these conditions the situation which confronted the United States authorities in attempting to maintain strict neutrality was a trying one, and the problem was made more difficult by the attitude of groups of persons in this country whose sympathies were with one or the other of the belligerents in Europe. The following are the most important questions which arose involving the United States and the various European Powers.

**Blockade and Neutral Trade.**—During the early months of the war Great Britain established her complete control of the seas, except in so far as it was interrupted by the operations of the German submarines. That Great Britain would take full advantage of her sea power was to be expected, and that in so doing serious difficulties would arise in regard to the rights of neutral nations was also clear. In the first place

there was the always vexed question of contraband. There was no Hague Convention which dealt with the question of conditional and absolute contraband. As the Declaration of London (see LONDON, DECLARATION OF) was declared by Great Britain not to be in force, the question had to be determined by the general rules of international law. But upon this question there was no general agreement among the nations. Belligerent Powers naturally wished to extend the list of contraband, while neutral Powers quite as naturally wished to restrict it.

A more serious and difficult question affecting neutrals arose, due to the peculiar geographical position of Germany. On two sides the country was bounded by neutral Powers which touched the sea. Through Holland and the Scandinavian countries contraband might be shipped from the United States or other neutral countries to Germany and thus nullify England's sea power. The problem which confronted Great Britain was to prevent contraband articles from reaching Germany, while at the same time not to interfere with legitimate trade between neutral countries. Shortly after the outbreak of hostilities Great Britain began detaining American ships bound for neutral ports on the ground that their cargoes were destined for the enemy. For some months the United States government did not protest, hoping that Great Britain would modify her policy. Finally on Dec. 26, 1914, the United States addressed a communication to Great Britain, calling attention to the interference by the latter with American commerce with neutral nations, on the ground that goods so consigned might reach the enemies of Great Britain. The United States authorities contended that "mere suspicion was not evidence and doubts should be resolved in favor of neutral commerce, not against it." To this note Great Britain replied on Jan. 7, 1915, that that country had not aimed to interfere with the bona-fide trade of the United States with neutral countries, but figures were given showing the marked increase in exports of such articles as rubber and copper from the United States to neutral countries contiguous to Germany. It was stated that with such figures the presumption was very strong that such goods were ultimately destined for a belligerent country. The note further stated that Great Britain was prepared to admit that foodstuffs should not be seized without the presumption that they were intended for the armed forces of the enemy. In regard to the placing of cotton on the list of contraband it was stated that the British government had not contemplated any such action. In conclusion the British government agreed to make reparation for any injury improperly done to neutral shipping.

A novel question arose from the action of the German government in placing under government control all of the food supply of the Empire. The British government declared that it would be impossible under these conditions to distinguish between food intended for the civilian population of Germany and food to be used by the German military forces. In view of this situation the British government stated that foodstuffs intended for consumption in Germany would be considered contraband.

For some months after the outbreak of the war Great Britain hesitated to declare a blockade of German ports. This attitude was due, in part at least, to the recognized difficulty of rendering such a blockade effective, in view of

the geographical position of Germany, and of the activities of submarines. But events forced Great Britain to abandon her somewhat anomalous position. On March 1, 1915, Mr. Asquith announced in the House of Commons that Great Britain and France, in retaliation upon Germany for her declaration of the "War Zone" around the British Isles (see below), would confiscate all goods of "presumed enemy destination, ownership, or origin." Such action, of course, could only be justified under the existing rules of international law on the presumption that a lawful blockade of German ports had been declared. In answer to an inquiry from the American government as to whether such a blockade was contemplated the British government stated that as an effective "cordon controlling intercourse with Germany had been established and proclaimed, the importation and exportation of all goods to or from Germany was, under the accepted rules of blockade, prohibited." The British government further defined the radius of activity of the French and British fleets in enforcing the blockade as European waters including the Mediterranean. It was further stated that they would refrain from exercising the right to confiscate ships and cargoes for breaches of the blockade, and restrict their claim to stopping cargoes destined to or coming from the enemy's territory.

In an extended communication addressed to the British government by Secretary Bryan (q.v.) on March 30, 1915, attention was called to the unusual character of the proposed blockade and the interference with legitimate neutral commerce which might readily result. The United States government was willing to concede that the changed conditions of naval warfare, especially the operations of submarines, might justify some modification of the old form of close blockade, but it was unwilling to concede the right of belligerents to blockade neutral ports. It was further pointed out that alleged illegal acts of Germany could not be offered as an excuse for unlawful acts on the part of Great Britain. In conclusion it was stated that the German Baltic ports were open to the trade of the Scandinavian countries, although it is an essential element of blockade that it bear with equal severity upon all neutrals.

For some months the question was allowed to remain in abeyance, because more serious questions had arisen in connection with Germany's submarine warfare. (See below.) It was clear, however, that irritation at the continued interference by Great Britain with American commerce was constantly increasing. On Aug. 3, 1915, the State Department at Washington published five diplomatic communications which had been exchanged between the two governments relating to the detention of American ships and cargoes. In response to the American note of March 30, 1915, on the subject of the restrictions imposed on American commerce by the British Orders in Council, Sir Edward Grey defended the Orders on the ground that it was necessary for Great Britain and her Allies to take every step in their power to overcome their common enemy in view of the shocking violation of the recognized rules and principles of civilized warfare of which she had been guilty during the present struggle. He further denied that the Orders in Council violated any fundamental principle of international law by applying a blockade in such a way as to cut off



the enemy's commerce through neutral ports, "if the circumstances render such an application of the principles of blockade the only means of making it effective." It was contended that the only question that could arise in regard to the new character of blockade was whether the measures taken conform to "the spirit and principles of the essence of the rules of war" as stated in the American note of March 30, 1915. Sir Edward Grey contended that there was precedent for the British policy in the position taken by the United States during the Civil War. In order to prevent contraband being shipped from neighboring neutral territory to the Confederacy the Federal government enforced the doctrine of the continuous voyage and goods destined for enemy territory were intercepted before they reached the neutral ports from which they were to be reexported. Such action, moreover, was upheld by the Supreme Court of the United States in the case of the *Springbok*. The main argument of the British government was that when the underlying principles governing blockade and contraband are not violated it is permissible to adopt new measures of enforcement.

To this contention the United States replied with a vigorous note on Oct. 21, 1915. It was stated that the so-called blockade instituted by the Allies was "ineffective, illegal and indefensible," that the "American government cannot submit to a curtailment of its neutral rights and that the United States must insist that the relations between it and His Majesty's government be governed, not by a policy of expediency, but by those established rules of international conduct to which Great Britain in the past has held the United States to account."

This note did not have the effect of forcing Great Britain to modify her blockade policy. On the contrary Great Britain served notice, on March 30, 1916, that thereafter the doctrine of continuous voyage would be applied to vessels carrying conditional contraband as well as to those carrying absolute contraband. See NEUTRALITY: INTERNATIONAL LAW.

On April 25, 1916, the British government made an extended reply to the protest of the United States. It was contended that the practices complained of were "judicially sound and valid" and that the relief neutrals sought was to be obtained by mitigation of necessary hardships rather than "by abrupt change either in theory or application of a policy based upon admitted principles of international law carefully adjusted to the altered conditions of modern warfare." The note further stated that "an impartial and influential commission" had been appointed to find ways to minimize delays and pledged the Allies to make their restraints as little burdensome as possible. In regard to the complaint that the methods adopted by the Allies in intercepting neutral trade had not hitherto been employed by belligerents, it was answered that "new devices for dispatching goods to the enemy must be met by methods of intercepting such trade." In particular it was pointed out that modern conditions, such as the size of the steamships, and the methods of concealing contraband, made it no longer feasible to search ships at sea and justified sending vessels into port for search.

At great length the note discussed the question of proofs of the destination of contraband. As in a previous note it was contended that figures

issued by the United States Department of Commerce showed that exports from the United States to the Scandinavian countries had increased threefold since the outbreak of the war, and there was strong reason to believe that much of this increase was not bona-fide neutral trade. It was pointed out that large consignments of meat had been made to such persons as dock laborers, lightermen, bakers, etc., and it was obvious that such consignments were subterfuges. In view of these facts it was contended that "no belligerent could in modern times be bound by a rule that no goods could be seized unless they were accompanied by papers which established their destination to an enemy country. To press such a theory is tantamount to asking that all trade between neutral ports shall be free, and would thus render nugatory the exercise of sea power and destroy the pressure which the command of the sea enables the Allies to impose upon their enemies."

The note finally denied the statement made by the United States government that the blockade was ineffective. It was stated that it is doubtful if there had ever been a blockade where the ships which slipped through bore such a small proportion to those intercepted.

In 1916 another cause of dispute arose between Great Britain and the United States. On July 18 the British government published a blacklist of 82 American firms and individuals under the Enemy Trading Act, which forbid any business dealings between them and British citizens. On July 28 the United States protested that it was "inconsistent with that true justice, sincere amity and impartial fairness which characterize the dealings of friendly countries with one another." Britain replied that the act concerned only its government and citizens and left the American names on the blacklist.

This note did not bring the questions at issue, between the United States and Great Britain, any nearer to a settlement. It was evident that while Great Britain was anxious to adopt a conciliatory policy in dealing with neutral commerce, she was unwilling to concede the principle for which the United States contended, viz., that trade between the United States and neutral countries should not be interfered with.

*Use of Neutral Flags.*—Early in the year 1915, the German government made representations to the government of the United States that British ships were making use of neutral flags in order to escape capture. Particular attention was called to the action of the captain of the British steamer *Lusitania* in raising the United States flag when approaching British waters, and it was stated that orders had been issued by the British government to all commanders to make use of neutral flags when necessary. On Feb. 10, 1915, the United States government addressed a note to the British government calling attention to this matter. Without disputing that in exceptional cases there was precedent for the use of neutral flags by merchant vessels to escape capture, it was pointed out that any general use of the American flag for such purposes would endanger American ships, by raising the presumption that they are of belligerent nationality. In answer to this the British government stated, on Feb. 19, 1915, that English law allowed the use of the British flag by foreign merchant vessels in order to escape capture, that instances were on record of United States vessels making such use of the English flag dur-

ing the American Civil War, and that it would be unreasonable to deny to British vessels at the present time a similar privilege. It was stated, however, that the British government had no intention of advising their merchant shipping to use foreign flags as a general practice.

*Interference with Mail.*—A determined protest was also made by the United States government against the interference by Great Britain with neutral mail in transit between neutral ports. It was contended that under The Hague Convention postal correspondence on the high seas is inviolable. To this protest the British government replied that this provision was not intended to cover the shipment of contraband by parcel post, and in order to prevent such shipment Great Britain would insist upon the right to examine mail packages on the high seas.

*Submarine Warfare and the War Zone.*—The European War witnessed for the first time the use of the submarine on a large scale in naval warfare. It was evident that the introduction of this new weapon would give rise to a number of novel questions. The frail construction of these boats makes them an easy prey, if seen, for warships or even for unarmed merchantmen which might sink the submarines by ramming them. These conditions, it was contended, make it necessary for the submarines to attack quickly and without warning. Furthermore the old method of capture by which a prize crew was placed on the captured vessel could hardly be followed by the submarines as the size of the crew was small and could not be spared for this purpose. The only feasible method of disposing of vessels captured by submarines was to sink them. But this raised the question of the safety of passengers and crew. The established rules of international law required that merchant vessels could not be sunk, unless they attempted to escape, until provision was made for the safety of passengers and crew. The United States first became involved in the issue when on Feb. 4, 1915, Germany declared the waters around the British Isles a war zone after Feb. 18, 1915. It declared its intention of sinking every enemy merchant ship found in the zone even if it was impossible to save the crew and passengers. It also stated that neutral ships entering the war zone were in danger.

The United States government promptly took notice of this proclamation, and on Feb. 10, 1915, sent a communication to the German government calling attention to the serious difficulties that might arise if the policy contemplated were carried out, and declaring that it would hold the German government to a strict accountability if any merchant vessel of the United States was destroyed or citizens of the United States lost their lives. In reply to this note the German government stated on Feb. 18, 1915, that, in view of the illegal methods used by Great Britain in preventing commerce between Germany and neutral countries, even in articles which are not contraband of war, the German government felt justified in using all means within its power to retaliate on England. Complaint was made of the large quantities of munitions of war which were being sent to Great Britain, and it was stated that Germany intended to suppress such traffic with all means at its disposal. Finally, it was suggested that, in order to avoid mistakes, all American vessels carrying noncontraband through the war zone should travel under convoy.

In order to avoid, if possible, the very serious consequences of the proposed German naval policy, the government of the United States addressed an identical note to Great Britain and Germany suggesting an agreement between these two powers respecting the conduct of naval warfare. The memorandum contained the following suggestions: (1) That neither power should sow floating mines on the high seas or in territorial waters, and that anchored mines should be placed only in cannon range of harbors for defensive purposes, and that all mines should bear the stamp of the government planting them, and be so constructed as to become harmless when separated from their anchors. (2) That neither should use submarines to attack the merchant vessels of any nationality, except to enforce the right of visit and search. (3) That each should require their merchant vessels not to use neutral flags for purposes of disguise.

The note further suggested that the United States government designate certain agencies in Germany to which foodstuffs from the United States should be sent, and that the German government guarantee that such foodstuffs be used for noncombatants only. Great Britain was requested to agree not to put foodstuffs on the list of absolute contraband, and that ships of foodstuffs sent to the designated consignees in Germany should not be interfered with.

Nothing of practical importance came from these suggestions. Germany replied, accepting some and rejecting others, while Great Britain reviewed the alleged violations of international law and defended the stoppage of foodstuffs destined for Germany as a legitimate incident of the blockade.

Thus matters rested pending the first case in which an American vessel should be sunk or American lives lost. On March 28, 1915, news was received that the British steamship *Falaba* had been sunk and that among those lost was an American citizen, Leon C. Thrasher. Accounts differed as to the actions of the steamship when called upon by the commander of the submarine to stop. The German government defended the action on the ground that the *Falaba* had attempted to escape after being warned, and that, upon being overhauled, ten minutes had been allowed for the crew and the passengers to take to the lifeboats before the vessel was torpedoed. While this case was still under consideration by the United States government, it was reported that the American vessel *Cushing* had been attacked by a German aeroplane in the English Channel on April 29, 1915, one bomb being dropped on the ship which caused some damage but no loss of life. Within two days word was received that the American steamer *Gulflight* had been attacked by a German submarine off the Scilly Islands on May 1. Two members of the crew and the captain died. For history of this case see section, *Sinking of the Lusitania*.

The submarine controversy took a new turn, when the *Deutschland*, a commerce-carrying submarine, entered the port of Baltimore on July 9. The question immediately arose as to her status. The British and French embassies made strong protests about her being allowed to enter an American port, claiming that she was potentially a war vessel. The State Department announced on July 15 that the submersible would be considered a merchantman. It further stated that she could not be turned into a war vessel without radical changes in her construction. Conse-

quently she returned to Bremen. She later completed the round trip again, her port of arrival in the United States being New London, Conn.

The entire world was startled on January 31, 1917, when Germany announced to neutral countries that all restrictions on submarine warfare were to be removed and that a new policy of ruthless undersea activity was to be carried on in an attempt to bring England into a state of submission. In the note sent to the United States Germany stated that "the attempt of the four Allied Powers (Germany, etc.) to bring about peace has failed, owing to the lust of conquest of their enemies, who desired to dictate the conditions of peace. . . . To the wish of conciliation they oppose the will of destruction. They desire a fight to the bitter end. . . .

"In brutal contempt of international law, the group of powers led by England does not only curtail the legitimate trade of their opponents but they also, by ruthless pressure, compel neutral countries either altogether to forego every trade not agreeable to the Entente Powers or to limit it according to their arbitrary decrees. Thus British tyranny mercilessly increases the sufferings of the world; indifferent to the laws of humanity, indifferent to the protests of neutrals whom they severely harm, indifferent even to the silent longing for peace among England's own Allies. Each day of the terrible struggle causes new destruction, new sufferings. Each day shortening the war will, on both sides, preserve the life of thousands of brave soldiers and be a benefit to mankind. . . .

"After attempts to come to an understanding with the Entente Powers have been answered by the latter with the announcement of an intensified continuance of the war, the Imperial government—to serve the welfare of mankind in a higher sense and not to wrong its own people—is now compelled to continue the fight for existence, again forced upon it, with the full employment of all the weapons which are at its disposal."

Accompanying this note were two memoranda which described the new war zones and the conditions under which American ships might sail. The entire coasts of England and France were included in the zone as well as the coastline controlled by the Allies in the Mediterranean Sea. Entrance to England was along a narrow lane 20 miles wide leading to the port of Falmouth. A similar lane was mapped out for approach to Greece. Traffic of regular American passenger steamers was permitted if they followed a certain course and bore certain distinguishing marks, laid down by the German government.

The publication of the note in the United States brought forth a storm of protest and demanded immediate action. President Wilson addressed Congress on the 3d of February concerning the situation. He gave a brief sketch of the relations between his government and Germany over the submarine controversy and stated that the latter had broken its pledges, and in accordance with his principles laid down in the *Sussex* case (see *Question of Armed Merchantmen*) he concluded, "I have therefore directed the Secretary of State to announce to His Excellency the German Ambassador that all diplomatic relations between the United States and Germany are severed and that the American Ambassador at Berlin will be immediately withdrawn." Then followed a period of suspense in which the American government was apparently

awaiting an overt act before taking any further measures. Popular indignation was aroused when several vessels, carrying American citizens, were torpedoed, but no one of them constituted the overt act.

On February 26 President Wilson again went before Congress and requested "that you will authorize me to supply our merchant ships with defensive arms should that become necessary, and with the means of using them, and to employ any other instrumentalities or methods that may be necessary and adequate to protect our ships and our people in their legitimate and peaceful pursuits on the seas." On February 26 it was officially reported that on the 25th the *Laconia* was torpedoed without warning and two Americans were drowned.

Immediately after the dismissal of the German Ambassador, the United States government took steps to put the country in a state of preparedness commensurate with the importance of the situation. All navy yards and army posts were closed to the view of the public and the customary reports concerning the movements of naval vessels were no longer published. Amateur wireless outfits were ordered dismantled and all others were taken over by the government. Guards were placed over government plants and arsenals and the militia was called out in several of the States. The State troops and the police of several cities were placed on guard at important bridges, aqueducts, and reservoirs. The Panama Canal and all American ports were watched to prevent obstructions from being placed at strategic points.

In the meantime the House of Representatives was working on the largest naval appropriation bill in the history of the country. The bill which finally passed the House by a vote of 353 to 23, on February 12, appropriated \$363,553,338.07. This bill also gave to the President the power to commandeer shipyards and munition plants "in time of war or national emergency." One million dollars was appropriated to acquire basic patents for an aeroplane suitable for government work. The Emergency Act passed on March 4 gave the President the following powers: "(1) . . . to place an order with any person for . . . war material as the necessities of the government . . . may require, and which are . . . capable of being produced by such person. (2) . . . to modify or cancel any existing contract for the building, production, or purchase of . . . war material; and if any contractor shall refuse . . . the President may take immediate possession of any factory of such character. (3) To require the owner or occupier of any factory in which . . . war material are . . . produced to place at the disposal of the United States the whole or part of the output of such factory. (4) To requisition or take over for use or operation by the government any factory or any part thereof, . . . whether the United States has or has not any contract . . . with the owner . . ."

The President also announced that the Navy Department would proceed to mount modern guns on all American merchant vessels that were to sail for Europe. These ships were to include those that were carrying munitions to the Allies. Gun crews from the American navy were to man these guns, and with this crew rested the decision as to whether they should sink a German submarine. This would precipitate actual warfare.

*The Mexican Note.*—On March 1, there appeared in the newspapers of the country a most sensational disclosure of an intrigue between Ger-

many and Mexico. The statement was issued on the authority of Secretary of State, Lansing. This note dispelled from the mind of the public any hope that we might still keep out of actual warfare. The note was dated Jan. 19, 1917, and was sent to Herr von Eckhardt, who was the German Minister to Mexico. It states in part: "On the 1st of February we intend to begin submarine warfare unrestricted. In spite of this it is our intention to endeavor to keep neutral the United States of America. If this is not successful, we propose an alliance on the following basis with Mexico: That we shall make war together and together make peace. We shall give general financial support, and it is understood that Mexico is to reconquer the lost territory in New Mexico, Texas, and Arizona. The details are left to you for settlement . . . suggest that the President of Mexico, on his own initiative, should communicate with Japan suggesting adherence at once to this plan. At the same time, offer to mediate between Germany and Japan." . . . This note caused widespread amazement and indignation throughout the entire country. Japan hastened to affirm in no uncertain tones that she had absolutely nothing to do with the whole affair. If anything, the note strengthened the relationship between that country and the United States. The fact that only a few days before the exposure of the Zimmerman note Carranza had sent identical notes to all the American republics, including the United States, asking that the western hemisphere should cease to send any further supplies to the European countries, in order to bring about a speedier peace, was construed in the United States to be a sure sign of strong German intrigue in the Mexican republic. President Wilson courteously but firmly refused to acquiesce in the proposition.

*The President's War Message.*—The President issued a call for the New Congress to meet in special session on April 2. He had attempted to get plenary war powers from the old Congress before it went out of existence but he was unable to do so. Probably at no time in our history has a congress met to face such a crisis as the one that existed. Congress met at noon on the 2d of April and at 8:30 P.M. of the same day President Wilson delivered his war message. The following are extracts from the message: "I have called the Congress into extraordinary session because there are serious, very serious, choices of policy to be made, and made immediately. . . . The new policy (see note of February 1st above) has swept every restriction aside. Vessels of every kind, whatever their flag, their character, their cargo, their destination, their errand, have been ruthlessly sent to the bottom without warning and without thought of help or mercy for those on board. . . .

"I am not now thinking of the loss of property involved, immense and serious as that is, but only of the wanton and wholesale destruction of the lives of noncombatants, . . . engaged in pursuits which have always, . . . been deemed innocent and legitimate. Property can be paid for; the lives of peaceful and innocent people cannot be. The present German warfare against commerce is a warfare against mankind. . . .

"The German government denies the right of neutrals to use arms at all within the areas of the sea which it has prescribed, even in the defense of the rights which no modern publicist has ever before questioned their right to defend. . . . Armed neutrality is ineffectual enough at best; in

such circumstances and in the face of such pretensions it is worse than ineffectual; it is likely only to produce what it was meant to prevent; it is practically certain to draw us into the war without either the rights or the effectiveness of belligerents. . . .

"With a profound sense of the solemn and even tragical character of the step I am taking and of the grave responsibilities which it involves, but in unhesitating obedience to what I consider my constitutional duty, I advise that the Congress declare the recent course of the Imperial German Government to be in fact nothing less than war against the Government and the people of the United States; that it formally accept the status of belligerent which has thus been thrust upon it. . . . We have no quarrel with the German people. We have no feeling toward them but one of sympathy and friendship. It was not upon their impulse that their government acted in entering this war. It was not with their previous knowledge or approval. . . .

"A steadfast concert for peace can never be maintained except by a partnership of democratic nations. . . . It must be a league of honor, a partnership of opinion. . . . Only free people can hold their purpose and their honor steady to a common end and prefer the interests of mankind to any narrow interest of their own. . . . The world must be made safe for democracy. Its peace must be planted upon the tested foundations of political liberty. We have no selfish ends to serve. We desire no conquests, no dominion. We seek no indemnities for ourselves, no material compensations for the sacrifices we shall freely make. We are but the champions of the rights of mankind. We shall be satisfied when those rights have been made as secure as the faith and the freedom of nations can make them. . . .

"To such a task we can dedicate our lives and our fortunes, everything that we are and everything that we have, with the pride of those who know that the day has come when America is privileged to spend her blood and her might for the principles that gave her birth and happiness and the peace which she has treasured. God helping her, she can do no other."

Congress took immediate action on this address by the President, with the result that on April 6, 1917, the executive signed the joint resolution of the House of Representatives and the Senate to the effect that the state of war thrust upon the United States by Germany was formally declared. The President was also given power to call on the naval and military forces of the United States, as well as the resources of the government, to bring the war to a successful conclusion. On the same day President Wilson issued a proclamation to the people of the country, in which he called upon the enemy aliens to abide by the laws of the United States and not to do anything which would give aid and comfort to the enemy. If they followed out these instructions they would not be disturbed. Otherwise they could be apprehended, restrained, secured, and removed from the country as alien enemies.

The first act in recognition of the war was the seizing of German vessels in the ports of the United States and her dependencies. There were 91 ships in American ports with a gross tonnage of 594,696. The total value was estimated at \$100,000,000. In almost every case it was discovered that the machinery had been removed or destroyed in such a fashion as to make the immediate use of the vessels impossible. The government stated

that the ships were being seized to protect them from further damage until it could be decided what could be done with them. They were later turned over to machinists and were finally put in order and used as transports, etc., by the government.

*War Preparations by the Army and Navy.*—Long before the declaration of war the United States government was engaged in putting its physical forces into first-class condition. On March 25, an executive order was issued increasing the enlisted personnel of the navy to 87,000 men, and on March 26, another order was issued to increase the Marine Corps to 17,400 men. Immediately after the declaration of war the entire navy was placed on a war footing. The naval militia, the naval reserves, and the coast guards passed under the control of the Navy Department. A nation wide recruiting campaign was carried on to bring the navy and Allied services up to their war strength.

A large fleet of "mosquito craft" was organized to patrol United States waters against attacks by German submarines and raiders. At first this was composed of privately owned power boats that were purchased by or given to the government. These were later augmented by 80- and 110-foot "chasers," built of wood, fast, and carrying a small gun fore and aft. In the latter part of 1917, the construction of these was given up, because of their inability to stand rough seas and because the Navy Department decided the money could be better spent on fast destroyers. Defensive war zones around the coastline of the entire United States and its dependencies were laid out.

Plans for the mobilization of the army went forward just as rapidly as those for the navy. Before war was declared several national guard units were called out to do police duties at bridges, etc. The War Department announced that 26 camps, with a capacity of 25,000 men, would be established throughout the country for the giving of military instruction to civilians.

*Council of National Defence.*—The economic side of the war was put in the hands of the Council of National Defence, which consisted of the members of the President's cabinet and a civilian advisory committee composed of business men and leaders of industry. A number of boards were appointed consisting of a group of experts, who were to organize war activities along special lines. The Food Board was placed under the charge of Herbert C. Hoover, the executive head of the Belgian Relief Commission. This board was to take such measures as would conserve the food supplies of the United States, and at the same time, as far as possible, supply the needs of the Allies. It also dealt with questions of food shortages, distributions, mobilization of agricultural resources, price control, and waste. In November, 1917, it held a "conservation" week and thousands of families received conservation display cards, showing that they would observe "wheatless and meatless" days to aid the government. Other important boards were also instituted. A committee of five was appointed to direct the operations of American railways during the war. The railways were taken over by the government on December 28, 1917. A General Munitions Board had charge of supplying munitions and equipment to the army and of adjusting the question of whether the government needed a man more in the industrial or military field. The Economy Board was organized to take care of the commercial interests of the country and to purchase raw

materials for the government. A Medical Board was formed by many prominent physicians to mobilize and organize the medical men and resources of the country.

The Federal Shipping Board was one of the most important organizations established. Its problem was to defeat the submarine by building a vast fleet to transport the American army and great quantities of supplies to Europe. It was organized as a \$50,000,000 corporation with Colonel Goethals as general manager. It was to build 1000 wooden ships of from 3000 to 5000 tons burden. The efficiency of this board was marred by continual wranglings over the nature of the vessels to be built. The result was several changes in the personnel of the board with an apparent securing of harmony of action.

*Enemy Aliens.*—At the outbreak of the war there were approximately 5,000,000 enemy aliens in the United States. An official proclamation was issued which forbade any enemy alien from remaining or residing "within half a mile of any governmental fort, factory, reservation, base of supplies, or any land used for war purposes." This act was not carried out strictly by the United States marshal. Permits were granted which allowed an enemy alien to remain in the proscribed area if he obeyed the law. The gradual unfolding of vast German plots, the destruction of munition factories, incendiary burning of food supplies destined for the Allies, and the activities of American newspapers, compelled the government to take more stringent action. Various raids were executed in different sections of the country and several hundred "suspects" were interned. The result was that in November, 1917, the President ordered all enemy aliens to register, and gave the Attorney-General the power to establish forbidden zones about warehouses, factories, etc. There were to be no exceptions to this order. United States troops were also provided to guard the waterfronts of seaports.

*The Draft Act.*—In the President's message to Congress on April 2, he submitted the idea of raising a national army by conscription. There was a strong protest against this in both the House and the Senate, but after a month's debate the President's idea prevailed, and on May 18, 1917, the selected conscription act was passed. The President by proclamation set aside June 5 as the day on which all males who had reached their 21st but not their 31st birthday were to register for military service. Nine million, six hundred and fifty-nine thousand, three hundred and eighty-two men registered. This included aliens. In different parts of the country there were attempts to avoid the law. Many of the delinquents were given another opportunity to register and some of the recalcitrants were arrested. The law authorized the President to appoint a local exemption board for each county and one for each 30,000 population in cities of 30,000 or more. He was also to appoint a board for each Federal Judicial district, which was to review the decisions of the local boards. The President himself was the final court of appeal from the district court. The exemption boards were to be composed of civilians only. Those specifically exempted by the law were Federal and State officials and members of religious sects who had conscientious scruples against war. The President was authorized to exempt "persons engaged in industries, including agriculture, found to be necessary to the maintenance of the mili-

tary establishments or the effective operation of the military forces or . . . the national interest during the emergency."

The cards of registrants were numbered in a red ink serial up to the total number in the district. Alphabetical arrangement was forbidden. Then the numbers were drawn at Washington and the men were called according to the drawing, which took place on July 20. The men were medically examined and those who were physically fit and not exempted were sent to some one of the 16 military cantonments constructed for the training of new recruits. Six hundred and eighty-seven thousand were called in the first draft. After the first draft was completed the system of selection was changed (Nov. 1917). All the remaining registrants were divided into five classes, according to liability for military service. Those in the first class were to be called first, those in the second next, and so on.

*Visits of Foreign Missions.*—The entrance of the United States into the war was followed almost immediately by the sending of diplomatic missions to that country from most of the Allied nations. The purposes of these missions were to express a feeling of appreciation and gratification for America's action and to discuss ways and means of obtaining the most practical co-operation. The British mission was headed by Arthur J. Balfour and the French mission by Rene Viviani and General Joffre. They were everywhere greeted with wonderful outbursts of enthusiasm. Russia, Italy, Belgium, Serbia, and Japan also sent diplomatic missions.

*Financing the War.*—The United States government determined to raise the money necessary for the conduct of the war by three methods, (1) loans, (2) revenue under the existing laws, (3) new taxation. The Treasury Department decided to raise the money immediately needed by means of bond issues. Consequently books were opened, offering \$2,000,000 worth of 3½ per cent convertible gold bonds. The loan was called the "Liberty Loan." Subscriptions closed on June 15, 1917. Amounts were allotted to each of the twelve Federal Reserve districts and in practically every district the amount allotted was oversubscribed. The campaign was carried on with a great display of posters, ringing of bells, and speeches by prominent men. There were approximately 3,000,000 subscribers and the loan was oversubscribed by almost \$1,000,000. Books were opened for a second liberty loan on Oct. 1, 1917. These offered from \$3,000,000 to \$5,000,000 worth of 4 per cent convertible gold bonds bearing interest from November 15. As was the case with the first Liberty Loan, the second Liberty Loan bonds were enthusiastically bought by the American people. The maximum amount was approximately reached by means of 10,000,000 individual subscriptions. The War Revenue Act as passed in September, 1917, contained drastic taxation measures. An additional tax and surtax were levied on incomes and a graduated excess profits tax on corporations, partnerships, and individuals was put in operation. Internal taxes on tobacco, liquor, transportation, amusements, etc., and an increase in postal rates were expected to produce a vast revenue. The estimated cost of the first year of the war was \$18,500,000,000.

*President's Address to Congress.*—On Dec. 5, 1917, President Wilson delivered a very important message to Congress. He emphasized the fact that the only possible peace was one after a

military victory, when it would be negotiated with responsible representatives of the German people. He stated that international peace after the war must come from a partnership of peoples and not of governments. America would consider the war won when the German people are ready to agree to a settlement based on justice and reparation of wrongs their rulers have done. "Our present and immediate task is to win the war, and nothing shall turn us aside from it until it is accomplished. Every power and resource, whether of men, or money, or of materials, is being devoted and will continue to be devoted to that purpose until it is achieved. Those who desire to bring peace about before that purpose is achieved I counsel to carry their advice elsewhere. I will not entertain it." He asked for a declaration of war against Austria and it was declared on December 7. His speech created a profound impression both at home and abroad.

*Peace Proposals.*—The most important move towards peace occurred in December, 1916. On the 12th of that month, Germany, Austria-Hungary, Turkey, and Bulgaria submitted practically identical notes to the diplomatic representatives of the United States, Switzerland, and other neutral countries as well as to the Vatican. No terms were mentioned but the Allies were asked "to enter forthwith into peace negotiations." The notes were forwarded to the Allies without comment. Russia immediately refused to open any negotiations whatever. Italy and France made similar declarations. Lloyd George, the new premier of England, declared that little could be expected of the peace move now and that "the very appeal for peace was delivered ostentatiously from the triumphal chariot of Prussian militarism."

Rather unexpectedly the United States, on December 18, sent a note to the belligerent nations asking them "the precise objects which would, if attained, satisfy them and their people that the war had been fought out." Germany replied on December 26 that the only thing she was willing to consider was a meeting of representatives of the belligerent nations while the war was continued.

The Allied reply was received on Jan. 12, 1917. It was a compilation of the views of all the Entente Powers and demanded (1) restoration of Belgium, Serbia, and Montenegro with indemnities; (2) evacuation of invaded territories of France, Russia, and Rumania with reparation; (3) reorganization of Europe under guarantees to insure to all nations respect and liberty of development; (4) restitution of territories wrested in the past from the Allies by force or against the people's will; (5) liberation of Slavs, Rumanians, Italians, and Czechoslovaks from foreign domination; (6) enfranchisement of population subject to Turkey; (7) expulsion from Europe of the Ottoman Empire. This note effectively stopped for the time being all attempts to bring about peace, inasmuch as the world realized that the demands of the Allies could be gained only on the battlefield and not in a conference.

*Pope Benedict's Peace Appeal.*—In August, 1917, Pope Benedict sent an identical note to all the belligerent powers on the subject of peace. The note as translated by the State Department at Washington was published in the American newspapers on August 16. The first paragraphs stated that the Pontificate has made every effort to remain absolutely impartial and thus espouse



the cause of no one group of belligerents. It relates the unsuccessful attempts to mediate at the end of the first year of the war and then states the "base of a just and lasting peace." . . . First, the fundamental point must be that the material force of arms shall give way to the moral force of right, whence shall proceed a just agreement of all upon the simultaneous and reciprocal decrease of armaments, according to rules and guarantees to be established, in the necessary and sufficient measure for the maintenance of public order in every State; then taking the place of arms, the institution of arbitration, with its high pacifying function, according to rule to be drawn in concert and under sanctions to be determined against any State which would decline either to refer international questions to arbitration or to accept it awards."

The Pope then takes up the question of the war, and suggests absolute freedom of the seas. He also asks for mutual restitution of all territory that has changed hands during the war. "As regards territorial questions, as, for instance, those that are disputed by Italy and Austria, by Germany and France, there is reason to hope that, in consideration of the immense advantages of durable peace with disarmament, the contending parties will examine them in a conciliatory spirit, taking into account, as far as is just and possible, as we have said formerly, the aspirations of the population, and, if occasion arises, adjusting private opinions to the general good of the great human society." He suggested that the questions of the Balkan States, Poland, and Armenia might be settled on the same principles.

The press in Entente countries severely criticized the Pope's appeal on the grounds that it made no condemnation of Germany's atrocities, the invasion of Belgium, and the submarine warfare. The Pope replied to this by stating that he was acting as a peacemaker and not as a judge and that if he attempted to decide which set of belligerents was right his peace attempt was certain to be a failure.

On Aug. 27, 1917, President Wilson replied to the Pope's note through Secretary of State Lansing. It stated that, "Our response must be based upon the stern facts and upon nothing else." After reviewing the methods suggested in the Pope's note, the President's reply states: "It is manifest that no part of this programme can be successfully carried out unless the restitution of the *status quo ante* furnishes a firm and satisfactory basis for it. The object of this war is to deliver the free peoples of the world from the menace and the actual power of a vast military establishment controlled by an irresponsible government which, having secretly planned to dominate the world, proceeded to carry out the plan without regard either to the sacred obligations of treaty or the long-established practices and long-cherished principles of international action and honor; which chose its own time for the war delivered its blow fiercely and suddenly; stopped at no barrier either of law or of mercy; swept a whole continent within the tide of blood—not the blood of soldiers only, but the blood of innocent women and children also and of the helpless poor; and now stands balked but not defeated, the enemy of four-fifths of the world. This power is not the German people. It is the ruthless master of the German people. . . . They (the American people) believe that peace should rest upon the rights of peoples, not the rights

of governments—the rights of peoples great and small, weak or powerful—their equal right to freedom and security and self-government and to a participation upon fair terms in the economic opportunities of the world, the German people of course included if they will accept equality and not seek domination. . . . We cannot take the word of the present rulers of Germany as a guarantee of anything that is to endure, unless explicitly supported by such conclusive evidence of the will and purpose of the German people themselves as the other peoples of the world would be justified in accepting. Without such guarantees treaties of settlement, agreements for disarmament, covenants to set up arbitration in the place of force, territorial adjustments, reconstitutions of small nations, if made with the German government, no man, no nation can now depend on."

President Wilson's reply to Pope Benedict received the hearty approval of the press of the United States. Even the German papers printed in that country seemed to favor the note. The Allies of the United States, through their statesmen and press, endorsed the stand taken and the more enthusiastic of them hailed Mr. Wilson as the spokesman of the Entente. In Germany the government and pan-German organs bitterly attacked the President's note, claiming that it was nonsense to say that the German people were oppressed by an irresponsible government. They cited the fact that the entire German people had time and time again repeated that they stand firmly behind the government. The Socialist newspaper, *Vorwärts*, stated editorially, "The government of a country at war with us has a perfect right to demand that for the conditions under which peace is to be concluded the people themselves shall be the guarantee." Semi-official organs in France, Great Britain, Italy, and Russia announced to the world that the reply of President Wilson represented their own attitude toward the peace proposal.

The official replies of the German and Austro-Hungarian Empires were made public on Sept. 22, 1917. The main theme of both notes was identical. It was that both empires agreed with the Pope's desire to have the right of might give way to moral force. Both stated that arbitration with efficient guarantees should follow an immediate disarmament by all the nations of the world. Freedom of the seas and the right of independent economic progress were inalienable to all nations. The press of the Entente countries passionately attacked the replies, not so much because of what was contained therein, but because of what was not said. Nothing was said of the evacuation, restitution, and indemnification of Belgium, nothing of Alsace-Lorraine, nothing of Poland, Armenia, Trentino, etc. Subsequent statements by German diplomats refused absolutely to debate the question of Alsace-Lorraine.

*Sinking of the Lusitania.*—Before the government of the United States had formulated any action in connection with these cases the civilized world was shocked at the terrible news that the Cunard Line steamship *Lusitania* (q.v.) had been sunk on May 7, 1915, by a German submarine off Old Head of Kinsale at the southeastern point of Ireland, resulting in the loss of 1150 lives, of whom 114 were known to be American citizens. Prior to sailing of the *Lusitania* from New York on her fatal voyage, an advertisement signed by the German Embassy ap-

peared in many American newspapers warning Americans of the danger of traveling on British vessels through the war zone.

The first feeling of horror at the terrible catastrophe was succeeded by a feeling of bitter resentment in America at what appeared to be a ruthless sacrifice of innocent lives. It appeared, at first, as if a break between the United States and Germany were inevitable. President Wilson (see WILSON, WOODROW) waited six days before taking definite action, stating that it was important to act with deliberation as well as with firmness. In the meantime the German government, on May 10, 1915, sent a communication to the United States government expressing its sympathy for the loss of American lives, but at the same time maintaining that the responsibility rested with the British government, which through its plan of starving the civilian population of Germany by prohibiting the importation of foodstuffs, had forced Germany to resort to retaliatory measures. It was further claimed that British merchant vessels were generally armed, and repeated attempts had been made by such vessels to ram submarines. Finally it was stated that the *Lusitania* carried a large quantity of ammunition in her cargo and warning had been given by Germany that such vessels were liable to destruction.

On May 13, 1915, the eagerly awaited statement of the United States was sent to Germany. With a dignity and an earnestness which the gravity of the situation called for, President Wilson reviewed the series of acts of German submarine commanders culminating in the sinking of the *Lusitania*, which he said "the government of the United States has observed with growing concern, distress, and amazement."

Referring to the claim that the alleged illegal acts of her adversaries justified Germany in adopting retaliatory measures the American note stated that the government of the United States could not admit that any such measures were legal which infringed the clearly established rights of neutrals under international law. These rights include the protection of the lives of noncombatants traveling on unarmed merchant vessels and the right of neutrals to travel on the high seas wherever their legitimate business calls them. In view of these clearly established principles the note stated that "it confidently expects the Imperial German government will disavow the acts of which the government of the United States complains; that they will make reparation as far as reparation is possible for injuries which are without measure, and that they will take immediate steps to prevent the recurrence of anything so obviously subversive of the principles of warfare, for which the Imperial German government have in the past so wisely and so firmly contended." In conclusion it was stated that "the Imperial German government will not expect the government of the United States to omit any word or any act necessary to the performance of its sacred duty of maintaining the rights of the United States and its citizens and of safeguarding their free exercise and enjoyment."

Some hope was felt that the German government would disavow the act when on May 11, 1915, a note was issued explaining its attitude with respect to American and other neutral ships in the war zone. It stated that the German government had no intention of attacking such neutral ships if they were guilty of no hostile act. Even if such ships carried contra-

band they were to be dealt with according to the rules of international law applying to prize warfare. It further stated that if a neutral ship should be destroyed by mistake the German government would "unreservedly recognize its responsibility therefor." While this did not cover the question involved in the *Lusitania* case, viz., the right of neutrals to travel in safety on merchant vessels under a belligerent flag, nevertheless it was a distinct modification of the policy announced in the proclamation establishing the war zone.

On May 28, 1915, the German government submitted a note defining its position in regard to the various questions raised in the American note. With regard to the cases of the *Cushing* and the *Gulflight* it was stated that an investigation was in progress and the results of this investigation would be communicated to the United States government shortly. (A note was sent by the German government on June 4, 1915, expressing regrets for the sinking of the *Gulflight*, explaining that no distinctive marks were seen on the vessel by which she could be identified. Germany further agreed to furnish full recompense for the damage done. In regard to the *Cushing* the German government asked for additional information in the possession of the American government in order that a conclusion might be reached in the matter.) In regard to the *Falaba*, it was again stated that the commander had disregarded the order to lay to and had sent up rocket signals for help.

Concerning the *Lusitania*, the German government took the position that the government of the United States had not considered all of the material facts in the case. It then repeated the charge that the *Lusitania* had guns on board mounted under decks, that the British government had issued orders to merchantmen to ram submarines, and that in view of these alleged facts the German commanders "were no longer in a position to observe the rules of capture otherwise usual." It was further contended that the *Lusitania* carried large quantities of ammunition and a number of Canadian troops, and that the German government was justified in destroying war munitions destined for the enemy. Finally it was asserted that the rapid sinking of the *Lusitania* was due to an explosion of the cargo of ammunition. (It was categorically denied both by the British authorities and the American port officials at New York that the *Lusitania* carried guns and war munitions.) The German government requested the American government to carefully consider the above statements and express its view in regard to them when the German government agreed to make a final statement as to its position.

It was at this juncture in the negotiations that Mr. Bryan resigned as Secretary of State on the ground that he was unable to agree with the President as to the proper policy to pursue in dealing with the difficulties with Germany. The two points upon which Mr. Bryan in his letter of explanation stated that he was not in agreement with the President were (1) as to submitting the *Lusitania* case to the investigation of an international commission and (2) as to warning Americans against traveling on belligerent vessels or vessels carrying cargoes of ammunition. Mr. Bryan held that the questions in dispute should be considered by an international commission, and secondly, that American travelers should be warned as above indicated.



The next diplomatic move was made on June 9, 1915, when the American government replied to the German government that it noted with satisfaction the position taken by the latter in the cases of the *Cushing* and *Gulflight*. In regard to the *Palaba* the United States was unwilling to admit that the attempt on the part of the merchantman to escape capture altered the obligation of the commander of the attacking vessel to provide for the safety of the lives of those on board the merchantman. In regard to the statements made by Germany that the *Lusitania* was armed, the American government stated that it had official information that such was not the case. With regard to the carrying of contraband by the *Lusitania*, it was held that this was entirely irrelevant to the question of the legality of the methods used in sinking the vessel. Brushing aside these extraneous issues, the American government took its stand firmly on the ground that it was "contending for nothing less high and sacred than the rights of humanity," and it stated that it "very earnestly and very solemnly" renewed its representations made in the previous note.

A reply to this note came from the German government on July 8, 1915. There was in this communication little evidence of a desire to meet the issue. There were the usual assertions in regard to England's inhuman methods of warfare and a suggestion for guarding the safety of American vessels in the war zone. The rejoinder to this note sent by the government of the United States on July 21, 1915, indicated very clearly that it considered the German communication evasive and unsatisfactory. It stated once more in the clearest manner possible the real question at issue, namely, that acts of reprisal against an enemy are indefensible when they deprive neutrals of their acknowledged rights. The note further gave pointed evidence that the United States government felt that the discussion had gone far enough and that "it cannot believe that the Imperial government will longer refrain from disavowing the wanton act of its naval commander." Despite this urgent suggestion from the United States that the matter should be speedily settled the negotiations dragged on. There was evidence, however, that the German government was attempting to find some solution which would concede most that the United States was contending for while at the same time avoid the appearance of being humiliated. For example, on Sept. 1, 1915, Ambassador von Bernstorff (q.v.), in a letter to the new Secretary of State Lansing (q.v.), gave assurance that German submarines would not sink any more liners without warning. It is to be noted that this included ships belonging to belligerents as well as neutrals. Finally, in November, the German government authorized its Ambassador at Washington to begin negotiations looking to a settlement of all outstanding issues between the two nations.

While the negotiations in regard to the *Lusitania* were being conducted, further complications arose from the continued action of German submarines and commerce destroyers. The sinking of the American schooner *Wm. P. Frye* by the German auxiliary cruiser *Prinz Eitel Friedrich* led to an exchange of notes in which Germany finally agreed to pay an indemnity for the loss of the vessel and cargo, and also made the important stipulation that thereafter no merchant vessel would be sunk until the safety of

the crew and passengers was made absolutely certain.

In the case of the British steamship *Arabic*, sunk by a German submarine on Aug. 19, 1915, the German government at first refused to acknowledge any obligation in the matter, as it was contended that the *Arabic* had attempted to ram the submarine. Later, however, the German government agreed to pay an indemnity for the loss of American lives on the *Arabic* and further stated that the instructions to the commanders of submarines had been made so stringent that a repetition of incidents similar to the *Arabic* was considered out of the question. Just when it appeared that the issues between Germany and the United States which had arisen in connection with the operations of the submarines were about to be settled, a new issue appeared which seriously complicated the whole situation.

*Question of Armed Merchantmen.*—It had long been a recognized right under international law for merchant vessels to carry armament for defensive purposes. This practice dates back to the days of piracy and privateers, and the arming of a merchantman was intended for purposes of defense against these irregular enemies. It was never contemplated that such armament would be available against a regular man-of-war. The appearance of the submarine, however, changed the aspect of an armed merchantman. Even small-calibre guns would be effective for sinking these frail craft.

The German government contended that Great Britain had mounted guns on a large number of merchant vessels and had issued instructions to the masters of such vessels to attack submarines which approached their ships. Under these circumstances the German government contended that such vessels were in fact men-of-war and might be sunk without warning. There was much force in this argument, and the United States government in a communication to the belligerent Powers stated that, in view of the changed conditions of warfare and the disappearance of pirates and privateers, it was seriously considering regarding all armed merchantmen as vessels of war. It was suggested that the belligerents agree that submarines observe the rules of international law and at the same time that all armament should be removed from merchant vessels.

While this note was being considered by the belligerent Powers, matters were brought to a head when on Feb. 10, 1916, the governments of Germany and Austria-Hungary notified the United States that after March 1, 1916, armed belligerent merchant vessels would be sunk without warning by the Teutonic Powers. At about the same time it became known that the Entente Allies would not accept the compromise suggestions proposed by the United States.

This new development in the submarine issue aroused serious concern in the United States. There was a strong sentiment in Congress that the government should carry out its announced position of considering all armed merchantmen as vessels of war. The administration felt, however, that as the belligerent Powers had declined to accept its suggestion for disarming merchant vessels it was not within its right to insist upon this modification of international law. For a time it appeared as if a serious breach would occur between Congress and the Administration. Resolutions were introduced in both Houses of

Congress, calling upon the President to warn Americans not to travel on armed merchantmen. The President did not welcome this intervention of Congress in the conduct of negotiations with foreign Powers, and in order to place Congress on record, he asked for and received what in effect was a vote of confidence from Congress.

This new issue once more delayed the final settlement of the issues between Germany and the United States. The President refused to continue further the negotiations relative to the *Lusitania* case until Germany gave assurances that the submarine warfare would be conducted in such a way as not to imperil Americans traveling on the high seas. In a note presented to the State Department, Feb. 16, 1916, Germany recognized her liability in the *Lusitania* affair. She promised reparation and said that submarine operations (as reprisals) must only be directed against enemy subjects.

The sinking of the French cross-channel steamer *Sussex* aroused serious concern in the United States in view of the promises which had been made by Germany. In a communication sent to the American government on April 10, 1916, the German authorities offered an explanation of the sinking of several vessels, and denied responsibility for the sinking of the *Sussex*. President Wilson, in order to bring the whole issue to a final settlement, if possible, sent on April 19, 1916, a communication to Germany which was clearly in the nature of an ultimatum. It stated that an impartial investigation conclusively established the fact that the steamer *Sussex* was sunk without warning by a torpedo of German manufacture. It then reviewed the submarine activities for the preceding year and pointed out how submarine commanders had continued to sink merchant vessels, both belligerent and neutral, without warning, despite the explicit promises of the German government. In conclusion it was stated that unless the German government "immediately declare and effect an abandonment of its present methods of submarine warfare against passenger and freight-carrying vessels, the government of the United States can have no other choice but to sever diplomatic relations with the German Empire altogether."

On the same day that this note was sent, President Wilson, before the two Houses of Congress, read a message in which he reviewed the course of negotiations in connection with submarine warfare and informed Congress of the nature of the message which he had sent to Germany.

In reply to this note the German government stated that it was possible that the *Sussex* was sunk by a German submarine, and if further investigation should establish this to be the case "the German government will not fail to draw the consequence resulting therefrom." On the other hand the German authorities denied the assertion made in the American note that there had been an indiscriminate destruction of vessels by German submarines. They defended the activity of the submarines as a legitimate retaliation for the alleged violations of international law by Great Britain. However, it was stated that submarine commanders had received further instructions to the following effect. "In accordance with the general principles of visit and search and the destruction of merchant vessels recognized by international law, such vessels, both within and without the area declared

a naval war zone, shall not be sunk without warning and without saving human lives, unless the ship attempt to escape or offer resistance."

While this was a substantial agreement to the demand of the United States, the note went on to say that Germany would expect the United States government to "demand and insist that the British government shall forthwith observe the rules of international law universally recognized before the war," and in case the British government failed to do so "the German government would then be facing a new situation, in which it must reserve to itself the complete liberty of decision." This concluding statement held out the possibility of a renewal of submarine warfare without restrictions in case Great Britain did not modify her policy of blockade.

To this communication the United States government returned an immediate reply, stating that it would rely upon a "scrupulous execution" of the new policy by the German government. At the same time the note stated that the United States government could not agree that the continuance of this new policy of submarine warfare by Germany was "contingent upon the conduct of any other government affecting the rights of neutrals and noncombatants."

*Shipment of War Munitions.*—Shortly after the outbreak of the war large orders for war munitions were placed by the Entente Allies with American firms. The complete control of the seas by the British and French fleets made it impossible for the Teutonic Powers to obtain similar supplies. Comment in the German press indicated that the feeling in Germany was very strong that the United States was not observing a strict neutrality by allowing such shipments. On April 4, 1915, Ambassador Bernstorff called the matter to the attention of the United States government officially. He maintained that while the United States had taken no action in regard to alleged violations of international law by Great Britain in interfering with neutral trade, it had allowed American firms to supply large quantities of war munitions to Germany's enemies. He maintained that conditions in the present war were unique, that while theoretically arms might be shipped from the United States to Germany, practically they could be sent only to her enemies. A real spirit of neutrality called for the stoppage of a trade which was aiding only one side.

In a vigorous reply to this note President Wilson set forth clearly the position of the United States. He first called attention to the fact that her relations with England could not be made a subject of discussion with a third government. With regard to the shipment of arms and ammunition, the President pointed out that any change in the laws of neutrality during the progress of a war would be a departure from the principle of strict neutrality and the placing of an embargo on the trade in arms would constitute such a change.

In reply to a similar protest by the Austro-Hungarian government on Aug. 1, 1915, the government of the United States on Aug. 12, 1915, made an exhaustive statement of its position. It reiterated the statement made in the reply to Germany that any change in the rules of neutrality made during a war would violate the spirit of neutrality. In addition it pointed out that it had never been the policy of the United States to maintain a large military establishment or great stores of ammunition and had

depended upon the right to purchase arms and ammunition from neutral Powers in time of war. To prohibit such trade would compel every nation to have on hand sufficient munitions of war to meet any emergency, and would practically make every nation an armed camp.

Apart, then, from any question of the legality of an embargo on arms, the United States government felt that it would be a mistaken policy as it would deliberately encourage the spirit of militarism.

*Relations with Austria-Hungary.*—During the year 1915 two serious disputes arose involving the United States and Austria-Hungary. The first of these concerned the activities of the Austro-Hungarian Ambassador to the United States, Dr. Theodor Dumba.\*

On Sept. 1, 1915, James F. J. Archibald, an American newspaper correspondent, was arrested by the British authorities, when the steamer *Rotterdam* put into Falmouth, for carrying dispatches from the German and Austrian embassies at Washington to Berlin and Vienna. Among the papers was a letter from Dr. Dumba, suggesting a plan for crippling the munition factories in America by fomenting strikes among the Austro-Hungarian laborers in these factories. Dr. Dumba admitted the authenticity of the documents and defended his action on the ground that it was his duty to bring to the attention of his fellow countrymen employed by the manufacturers of munitions that they were engaged in enterprises unfriendly to the fatherland, and that the Imperial government would regard them as guilty of a serious crime, punishable by penal servitude should they return to their own country.

This explanation proved unsatisfactory to the American government and Secretary Lansing notified the Austrian government that as Dr. Dumba had "conspired to cripple legitimate industries of the people of the United States and had flagrantly violated diplomatic propriety by employing an American citizen protected by an American passport as a secret bearer of official dispatches through the lines of the enemy of Austria-Hungary," he was no longer acceptable to the United States as the Ambassador from Austria-Hungary. In answer to this demand the Austro-Hungarian government agreed, on Sept. 27, 1915, to recall Dr. Dumba.

The second incident involving the two countries was the sinking of the Italian steamer *Ancona* on Nov. 7, 1915, by an Austrian submarine. The *Ancona* had attempted to escape but was overhauled. It was charged by the survivors that the submarine continued to fire after the *Ancona* had stopped. In all more than 200 lives were lost, among them nine American citizens. In a vigorous note the government of the United States, on Dec. 6, 1915, demanded that the Austro-Hungarian government should disavow the act, that the commander of the submarine should be punished, and that an indemnity should be paid for the loss of the lives of American citizens.

To this the Austro-Hungarian government replied on Dec. 15, 1915, asking for more specific information upon which the government of the United States based its charges. On Dec. 19,

1915, the American government replied, stating that it based its charges on the official report of the Austro-Hungarian Admiralty, and declined further to specify the additional testimony tending to corroborate the Admiralty's report. The incident was closed by the Austro-Hungarian government granting practically all of the American demands. In a note sent Dec. 29, 1915, it was stated that the submarine commander had been punished for not taking into consideration the panic aboard the *Ancona* which rendered disembarkment difficult. It agreed that Austria-Hungary should indemnify American citizens affected. While disclaiming responsibility for lives lost by the shots which were fired while the *Ancona* was attempting to escape, or for those lost by the faulty lowering of lifeboats, Austria agreed not to press for proof that the American lives were lost through the fault of the submarine commander, and agreed "to extend indemnities to those whose cause cannot be established." In conclusion the note stated that the Austro-Hungarian government "reserved to itself the right to bring up for discussion at a later time the difficult questions of international law connected with submarine warfare."

*Public Opinion in the United States.*—Public opinion in the United States was sharply divided as to the lessons to be drawn from the war, and as to the policy which that country should adopt. On the one hand a vigorous campaign was inaugurated to strengthen the military and naval defenses of the United States. It was urged with great earnestness that the war had demonstrated the futility of military unpreparedness and that the United States was in particular danger because of her great wealth which other nations would covet.

On the other hand it was urged with equal fervor that the cause of the war was primarily the great military armaments in Europe, and that the United States would make a great mistake by joining in the competition for military preparedness. It was pointed out by the advocates of peace that the energies of the country should be devoted to finding some means, if possible, to end the war, and to further the plans for preventing future struggles. Perhaps the most noteworthy, and certainly the most picturesque, of the efforts of the pacifists in the United States was the expedition organized by Henry Ford (q.v.), a millionaire automobile manufacturer, to go to Europe to discover some means of ending the war. A liner was chartered for the purpose. Included in the party of about 150 were a number of prominent American men and women, together with a considerable number of newspaper and magazine writers and moving-picture men. The United States authorities let it be known that the mission was in no sense officially sanctioned, while the European countries at war clearly indicated that the expedition was not welcome. Despite these discouragements the party sailed on Dec. 4, 1915. During the voyage serious discord developed among the members of the party. The expedition reached Christiansand, Norway, on Dec. 18, 1915. A few days later it was announced that Mr. Ford would have to leave the party and return to America because of illness. The remainder of the party went on to Copenhagen, and later to The Hague, where a number of meetings were held with delegates from other neutral countries. The expedition accomplished nothing of importance towards ending the war.

\* Constantin Theodor Dumba, born (1856) in Vienna; graduated in law at the University of Vienna (1878) and then studied in Paris; entered Austrian Foreign Office (1879); Privy Councillor (1908); Ambassador from Austria to the United States from 1913 till his recall on demand of the United States government in 1915.

President Wilson, in order to get first-hand information concerning the condition of affairs in the belligerent countries, sent Edward M. House\* abroad as his personal confidential agent. It is thought that the President was seeking to discover whether the time was opportune to offer mediation.

**Scandinavian Countries.** Immediately after the outbreak of the European War the three Scandinavian countries declared their neutrality and the governments of Norway and Sweden published identically worded explanatory communications which stated that the two governments had agreed to maintain their neutrality and had exchanged binding assurances with a view to preventing any situation arising which would precipitate hostilities between them.

In Sweden there was a strong Germanophile sentiment among the military class, which is in reality more a dislike of Russia than a love of Germany. This anti-Russian feeling is due mainly to the fear that Russia contemplates aggression against the Scandinavian peninsula. In Denmark and Norway the popular sentiment appeared to be favorable to Great Britain. The geographical position of these countries, especially of Denmark and Sweden, made it peculiarly difficult for them to maintain their announced position of neutrality. They controlled the entrance to the Baltic Sea and were so situated as to provide easy transit to both Russia and Germany.

On the initiative of the Swedish government a conference of the three Scandinavian monarchs was held at Malmö, Sweden, in December, 1914. It was called for the purpose of taking counsel together regarding means for limiting and counteracting the economic difficulties imposed on the three countries by the war. This conference was followed by the issuance of an identically worded protest to the nations at war against their measures which threatened neutral commerce.

The interference with Swedish trade, especially by Great Britain, led to the adoption of retaliatory measures on the part of Sweden. Embargoes were laid on wood pulp and other commodities needed by the Entente Allies. In order to reach a solution of the question of neutral trade Great Britain, in July, 1915, sent a commission to Sweden. Some months later it was stated that a satisfactory arrangement had been made.

A second conference of the premiers and foreign ministers of the three countries was held in March, 1916, at Copenhagen with the purpose of strengthening the understanding between them. It was reported that an agreement had been reached that if any one of the three nations should become involved in the war, the other two would not align themselves with the opposing belligerents. It was further decided that at the proper time steps should be taken by the three Powers in conjunction with other neutrals to protect the interests of neutrals generally.

**Netherlands.** The geographical situation of the Netherlands made its relations to the belligerents even more difficult to adjust than was the case in the Scandinavian countries. At the outbreak of the war there was considerable apprehension in Holland that their country might

suffer a fate similar to that of Belgium. The authorities, however, determined to defend the neutrality of Holland to the best of their ability, and with this end in view the Dutch army was mobilized and sent to the frontiers. These military measures, together with the expenditures made in caring for a large number of Belgian refugees who fled to Holland, entailed a considerable financial burden upon the country. In common with other neutral countries, Holland was seriously affected by the restrictions placed upon neutral commerce, especially by Great Britain. As Holland offered an easy means of communication with Germany, Great Britain deemed it necessary, in order to make her blockade of Germany effective, to adopt some measure to prevent neutral goods passing through Holland to Germany. With this end in view there was organized a company known as the Netherlands Overseas Trust, to which was to be consigned all imports which might be of use to Germany. This company agreed to dispose of these imports so that none should reach Germany.

**Switzerland.** The situation of Switzerland was unique. The little country was completely surrounded by the nations at war. The sympathies of the people were determined by their racial affiliations. There are three distinct racial groups in Switzerland, namely, German, French, and Italian, of which the German group is the largest. Despite these conflicting sympathies, the Swiss authorities were determined to maintain the neutrality of the country, and the army was mobilized in order to prevent any violation of this neutrality by the belligerent Powers. In dealing with the problem of imports into Switzerland, the Entente Allies followed much the same policy as had been adopted in Holland. There was organized a company called the *Société Suisse de Surveillance Économique*, through whose hands imports which might be of service to Germany were to pass.

**South American Countries.** All of the South American countries were seriously affected by the outbreak of the European War. A large amount of the business in these countries was carried on by European credit and the dislocation of the European financial markets seriously crippled the business interests in South America. Moreover, a large part of the export trade of these countries was cut off and emergency measures had to be adopted to relieve the situation. In Chile a moratorium was declared, and the President was empowered to extend government aid to the nitrate industry, the most important in the country. Argentina floated two loans, one of \$15,000,000 and the other of \$25,000,000, in the United States. This was the first time a South American country had negotiated a loan directly in the United States.

Chile became involved in a dispute with the belligerents when, on April 2, 1915, the German cruiser *Dresden*, which had entered Chilean waters and had been ordered interned, was sunk by a British squadron. Chile demanded an apology from Great Britain for this violation of her sovereignty and this demand was conceded. Germany sent a sharply worded note protesting against the acceptance of this apology, and Chile replied by demanding an apology from Germany for overstepping the bounds of international law in intervening in a question which involved Chile's relations with another Power. After some discussion the matter was adjusted peaceably.

\* Edward Mandell House, born (1858) at Houston, Tex.; educated at Cornell University; active in Democratic politics in Texas and director of the campaigns of many successful Democratic nominees for Governor from 1892; himself never a candidate for office; confidential adviser of President Wilson from the time that Wilson was Governor of New Jersey.

*Reception of the Barred Zone Note.*—The issuance of the barred sea zone note on Jan. 31, 1917, created a profound impression in all the South American republics. None of them, however, seemed ready to take the step adopted by the United States government and sever diplomatic relations. Brazil replied in part "... The unexpected communication we have just received announcing a blockade of wide extent of countries with which Brazil is continually in economic relations by foreign and Brazilian shipping has produced a justified and profound impression through the imminent menace which it contains of the unjust sacrifice of lives, the destruction of property, and the wholesale disturbance of commercial transactions. . . . For these reasons the Brazilian government, in spite of its sincere and keen desire to avoid any disagreement with the nations at war, with whom it is on friendly terms, believes it to be its duty to protest against this blockade and consequently to leave entirely with the Imperial German government the responsibility for all acts which will involve Brazilian citizens, merchandise, or ships and which are proved to have been committed in disregard of the recognized principles of international law and the conventions signed by Brazil and Germany.

Chile refused outright to recognize the legality of the German attempt to establish barred zones and "consequently reserves liberty of action to protect all her rights in the event of any hostile acts against her ships." Argentine, Peru, Uruguay, Bolivia, Panama, and Cuba all took similar action. The keynote of their replies were that any act on the part of Germany against their rights as neutrals would be considered unfriendly.

Soon after the declaration of war between the United States and Germany, Brazil issued a proclamation of neutrality as between those two nations, although there was a strong party in the country which favored a declaration of war based on the grounds laid down by President Wilson of the United States. She kept this attitude of neutrality until June 4, 1917, when the Brazilian Ambassador handed to the State Department at Washington a note which read in part, "Brazil ever was and now is free from warlike ambitions, and, while it always refrained from showing any impartiality in the European conflict, it could no longer stand unconcerned when the struggle involved the United States, actuated by no interest whatever but solely for the sake of international judicial order, and when Germany included us and the other neutral powers in the most violent acts of war." Brazil seized about 150,000 tons of German merchant vessels in her harbors and ordered her fleet to cooperate in the patrol work in the southern Atlantic.

Brazil declared war on Germany on Oct. 26, 1917, and immediately took steps against her large German population. She annulled all contracts entered into for public works with Germans, forbade land cessions to Germans, took over the control of German banks, and interned all German subjects. Disorder immediately broke out in the large German settlements in southern Brazil, and an army had to be sent to restore order. Shortly after her declaration of war Secretary of State Lansing (United States) published two telegrams from Count Luxburg, the German Charge d'Affaires at Buenos Aires to Berlin through the Swedish legation, stating

that the situation in Brazil was serious, but that a visit of a submarine squadron would materially relieve the situation. Brazil had knowledge of these before she declared war.

By the end of 1917 the situation in Argentina was very acute. On Sept. 8, 1917, Secretary of State Lansing published telegrams that had been sent to Berlin in cipher through the intermediary of the Swedish foreign office. The first one under the date of May 19, 1917, states that in the future Germany had better adopt one of two policies with regard to Argentine ships. They must either let them alone or sink them without leaving a trace of their sinking (spurlos versenkt). In a telegram dated July 9, he reiterated the same sentiments. The publication of these created a profound impression of the country. Mobs gathered in the streets of the capital, German houses were wrecked and burned. Troops had to be called out to quell the riots. Count Luxburg was handed his passports and the Argentine Senate passed a resolution asking for the breaking off of relations with Germany. President Irigoyen refused to sanction the resolution even after it had been passed by both houses. He announced that Argentina would maintain her neutrality as long as Germany lived up to the pledge given in October, 1917, "to recognize the Argentine flag and respect the nation and people." The country was almost in a state of civil war over the question of whether the country should go to war or not. A big strike on the railroads helped to mix up matters further and to put the state in a serious plight.

Costa Rica severed diplomatic relations with Germany on Sept. 21, 1917. On October 6 the Peruvian government handed his passports to the German minister. On October 10, the government announced that the harbors of Peru were opened to the warships of the Allies. On October 8, Ecuador announced that the minister from Peru who was also minister to Ecuador would not be received in that country. In December, 1917, she broke off diplomatic relations with Germany entirely. Uruguay broke off relations with Germany on October 7. The President in his address to the Parliament stated that Uruguay had not received any harsh treatment at the hands of Germany but that the country should join hands with those fighting for justice and democracy. She seized almost 50,000 tons of German shipping in her harbors. Paraguay had also broken off relations with Germany soon after the publication of the "barred sea" note.

In December, 1917, the State Department at Washington published several more telegrams sent to Berlin by way of the Swedish legation. The purport of most of them was to unify the German population of South America, which was very great and organize them against the South American republics. They spoke very sneeringly of the people of South America, referring to them one time as Indians with a slight veneer over them.

South American countries that broke relations with Germany by January, 1918, were Bolivia, Brazil (declared war), Ecuador, Paraguay, and Uruguay. Central American countries that had broken relations were Costa Rica, Honduras, Guatemala, and Nicaragua. Panama and Cuba declared war on Germany on April 7, 1917, the day after the United States declared war. Haiti broke off relations in June.

## IX. RELIEF MEASURES

The outbreak of the European War very soon made it evident that millions of innocent victims in the fighting areas would be without independent means of support on account of wholesale destruction of property, the confiscation of food supplies, and the paralysis of industry. This was first illustrated in Belgium, where it was estimated that by November, 1914, over 6,000,000 people had been rendered homeless and 1,500,000 destitute. The prosecution of the war, however, resulted in the creation of a similar situation in Russian Poland, Galicia, and in Serbia. The situation in Poland was even worse than that in Belgium. Finally the unprecedented butchery of the Armenians by the Turks rendered relief for the remnant of the Armenian population an absolute necessity.

As early as September, 1914, relief organizations began to be formed in the United States. After considerable duplication at first, relief committees gradually were systematized under central committees. All sorts of devices were resorted to, including appeals through newspapers, endless-chain whist parties, fairs and bazars, theatrical and musical performances, "tag" days, balls and fêtes of various kinds, and appeals through churches and other organizations.

**Commission for Relief in Belgium.** This was the most extensive relief organization, embracing all neutral countries. It was brought into existence through the activities of the American and Spanish ambassadors at London and ministers at Brussels, the American Ambassador at Berlin and the American Minister at The Hague. There were national organizations in America, Spain, Italy, and England, besides a most extensive distributory organization in Belgium and northern France. It carried out the distribution of its aid in Belgium through the Comité National de Secours et d'Alimentation. Similarly on account of the devastation in the occupied French territory the Comité d'Alimentation du Nord de France was organized. The commission had assembling depots in every State in the United States, and representative executives in all but about 12 States.

The committee secured pledges from England, Holland, and Germany, permitting the transportation of food products to the occupied territory and the pledge of Germany that such food would not be confiscated for war purposes. The general policy of the commission was to cooperate with organizations of every sort in Belgium and northern France; local committees were brought into existence in almost every commune of the occupied territory, and over these were district and provincial committees, all under the Comité National. The work was carried out under three main divisions: the Provisioning Department; the Financial Relief and Exchange Department; and the Benevolent Department. The Provisioning Department provided food for about 7,000,000 people in Belgium and 2,300,000 in northern France. Foodstuffs were sold to the population and the profits thus secured were used by the Benevolent Department for the care of the destitute. Food was given out through a system of canteens covering all Belgium, meals being supplied at a per capita cost of only eight cents a day. There were also baby canteens, cheap restaurants, meals for school chil-

dren, and in some cases provision of shelter. Aid was also given to or through the following: a committee to aid doctors and pharmacists by supplying medicines, serums and other necessities; child institutions working for the better feeding of infants, the aid of private and public orphanages, and assistance to war orphans and other homeless children; the treatment of indigent consumptives; an agricultural committee to control the supply of seeds and fodder; a committee for the aid and protection of artists, some 50,000 lace workers (mostly Belgian women), destitute foreigners, and refugees from other localities; a committee for the rehabilitation of churches; local workrooms for the repair of clothing for the destitute; and miscellaneous grants for Cardinal Mercier for trade training for maimed soldiers, and for maternity hospitals.

The total amount of money entrusted to the commission up to April 1, 1917, was \$250,000,000, which, with the exception of overhead charges, were spent for food in Belgium and France. The British and French governments contributed \$108,121,358 for relief in Belgium. After the diplomatic break between the United States and Germany the Dutch took over the work of the Commission.

**Belgium Relief Fund.** This fund "for women, children and other noncombatants" had its headquarters in New York City. It embraced numerous local committees, including one in every State. Most of the cash received was spent for food, but small sums were sent to refugees in Holland and to war victims in the unoccupied parts of Belgium.

**Jewish Relief.** On account of the great number of Jews in Poland and other parts of Europe who suffered extreme privation as a result of the war, the American Jewish Relief Committee for Sufferers from the War was organized in New York City. Towards the close of the year 1915, a most active campaign for funds was undertaken. Local committees were formed in cities throughout the country. In 1916 a great bazar was held in New York City which realized about \$1,000,000.

In Great Britain was formed the Russian Jews' Relief Fund for the aid of Jews in Russia and Poland. It had branches in all the principal cities. By means of it over 120 relief centres were feeding every day more than 200,000 homeless and destitute Jews.

In Russia a central relief committee at Petrograd sent out word that military authorities had forcibly removed 250,000 Jews from their homes in the occupied territory and that 200,000 more had left voluntarily. The committee had opened employment agencies in 31 cities and equipped 10 workshops. Hospitals, asylums, infirmaries, and schools were opened.

**Other Funds.** There were a considerable number of other agencies in America collecting money and supplies for the relief of special classes of victims. Among these were the American Ambulance Fund, the Duryea War Relief Fund, the American Girls' Aid, the Fund for the Relief of Women and Children in France, the Vacation War Relief Committee, the Cardinal Mercier Fund, the National Allied Relief Committee, the Serbian Relief Fund, the National Committee for Syrian and Armenian Relief, the Polish Victims' Relief Fund, the American Polish Relief Commission, and the British-American War Relief Fund.

**Red Cross.** This society was put to the se-



verest test it ever had to undergo. In all the belligerent countries, the work of the relief committees was supplemented by the efficient service rendered by the Red Cross Society. The American National Red Cross Society rendered greater continuous service than was ever given by any Red Cross of a neutral country during a foreign war. At the outbreak of the war this society had an enrollment of about 6000 nurses and surgeons. It sent over a number of surgical and sanitary units (a unit is a working force of 3 surgeons and 12 nurses sent to a hospital, together with the necessary supplies) for hospital work and the relief of noncombatants. An enormous quantity of purchased and donated medical, surgical, and hospital supplies, bed linen, garments, etc., were shipped from the United States to practically all the battle fronts by the American Red Cross. In Serbia and Montenegro the American Red Cross, in conjunction with the Rockefeller Foundation, suppressed the epidemic of typhus fever which destroyed 150,000 lives.

#### X. FINANCIAL AND ECONOMIC ASPECTS

In ancient times wars involved the entire male population and frequently the women as well in the actual fighting and campaigning, but modern wars affect the vast majority of the population, even of belligerent nations, only through their economic relations. The development of the vast mechanism called into operation by war to-day has however required such immense financial transactions and such gigantic demands upon industrial resources that these indirect effects in the European War were felt not merely by every family in the fighting areas but indeed by every family in the civilized world. The first immediate financial effect of the outbreak of war is a disturbance of the machinery of international credit. Foreign investments frequently aid during peace in restoring the balance of trade, but in this war investment movements were exactly reversed. Thus normally the great excess of United States exports of merchandise over imports is offset in large part by foreign investments in American securities. But the war brought a sharp reversal of this process, the New York Stock Exchange being deluged with orders from abroad to sell at any price. The outbreak of hostilities creates a desire to delay payment of obligations owed but to insist on immediate payment of those due. Trade temporarily comes to a standstill and gold shipments become dangerous and are impeded by great advances in insurance rates and by the reluctance of its holders to part with it. Moreover so paralyzing was the effect of the war at the moment it began that a temporary cessation of international exchange must have been inevitable. The greatest force of these conditions was naturally felt at London, the world centre. Consequently we find there the government taking most extraordinary measures to restore the movement of exchange. In war as in times of financial crisis each nation seeks to increase its gold holdings. This can be done only by increasing exports, decreasing imports, selling foreign investments, or contracting obligations abroad. Now it is not possible for belligerent nations to increase their exports because of the disturbance of their own production, the drafting of workers into the armies, the increased demand for goods due to the war, and, in the

case of nations hostile to England, the control of the high seas by the British fleet. On the other hand all fighting nations experience a greatly increased demand for goods, especially for food and all kinds of military supplies. This may be in part offset, and vigorous efforts were made in all countries and notably in England, France, and Germany to offset this in part, by cutting down the consumption of articles classed as luxuries. The great reduction of trade to and from the Central Powers made their foreign exchange problem relatively simple, though the rates of exchange ran heavily against them. The Allies on the other hand began the war with rates of exchange in their favor, mainly owing to the enormous obligations of the United States. This situation, however, was within a few months exactly reversed owing to the extensive purchases of the Allies and the great volume of American securities sold by them. So unfavorable became the rate and so necessary were American goods that international loans of unprecedented size were effected to enable the Allied Powers to continue their purchases in the American market.

Closely involved with the problem of international exchange are the banking institutions and their rates of interest. In addition, however, the banks must meet great internal problems connected with currency, the flotation of government loans, and the special problems arising from the unique conditions in internal trade. Currency systems are deeply affected though less markedly than formerly when their basis was less firmly established. Nevertheless the shock of war was everywhere so pronounced in its effect upon instruments of credit that every belligerent nation and the United States were compelled to issue additions to their outstanding currency. The interruption of foreign trade and the consequent dislocation of business are reflected in the movement of the stock markets. Almost upon the instant that hostilities began the world's stock exchanges were paralyzed. The Bourses at Toronto and Madrid closed July 28; those at Vienna, Budapest, Brussels, Antwerp, Berlin, and Rome on July 29; and those at Paris, St. Petersburg (Petrograd), Montreal, and all South American centres on July 30. This threw the burden of the world's stock market operations on the London and New York exchanges. The former of these closed on July 31 for the first time in its history. The governors of the New York Exchange thus faced a crucial situation. A panicky state of mind prevailed; brokers were deluged with orders, especially from abroad, to "sell at the market"; it was evident that to remain open meant complete demoralization. Consequently this exchange also was closed on July 31, shortly after that at London.

The gradual readjustment of industries to the new war basis is another fundamental aspect of its effects. Never before was concerted action in industrial life so supremely important for the outcome of a trial at arms. The war brought about an actual mobilization of industries for war purposes in every belligerent country. Moreover the productive efforts of neutrals, not merely in munitions manufacture, but in many lines, were tremendously stimulated. The productive power of the entire world was raised almost to its highest pitch in the vast attempt at mutual destruction by the belligerents. Never were goods produced so abundantly and

never was capital destroyed so rapidly or the world hastened towards pauperization at such a pace. The nearly complete cessation of exports from the Central Powers involved a violent readjustment in many industries previously engaged in producing for foreign markets. Among the Allies such industries were less disturbed, while in the United States and other neutral countries there were numerous transformations due not merely to the development of munitions factories, but to the manufacture of all kinds of military supplies, and the development of industries for supplying articles previously imported from Germany and Austria as well as supplying the similar needs of other neutrals. Finally the outbreak of the war was speedily followed in every nation by the adoption of special financial measures for supplying the needed public funds and the longer the war continued the more vital became the extent, variety, and basis of the various war loans. The foregoing—exchange, banking, currency, stock market, war loans, and the readjustments of industry—constitute the principal features of the effects of war on finance and trade.

**International Exchange and Banking Problems.** The financial problems confronting the bankers and traders of Great Britain were of the most momentous importance for the trade and commerce of the world. The priority of England in the development of international trade had long since made London both the financial and commercial centre of the world. In consequence an important part of London financial institutions had been devoted to settling accounts between debtors and creditors in all parts of the world. Here are included the accepting houses, bill brokers and discounters, and the banks. The immense volume of this business is realized when it is known that at any one time there were before the war about \$1,600,000,000 of trade and finance bills for which the accepting houses and banks were liable, many millions falling due daily. The entire system of handling international exchanges collapsed early in August and it was not until about mid-September that regular quotations of rates of exchange again appeared in London. Accepting houses and joint-stock banks faced ruin because clients for whom acceptances had been made failed to remit; but these clients themselves were confronted with canceled orders, cessation of trade, stoppage of the supply of goods, impossibility of remitting, and similar contingencies. The discounters and bill brokers found themselves with large quantities of discounted bills on hand for which they could not be reimbursed and at the same time their banks were calling for a return of loans. Even the banks themselves were directly involved through the possession of bills which they had discounted. Moreover their loans to bill brokers were counted as quick assets and the embarrassment of the brokers necessarily weakened the banks. To check demands upon its resources the Bank of England raised its rate to 10 per cent. See **PANIC, FINANCIAL.**

Before this situation became unmanageable the government on August 2, two days before its own declaration of war, declared a moratorium on bills of exchange to last one month. This checked the tendency to panic by giving a breathing spell during which methods and means of handling the problem were formulated.

Nine days later a Treasury statement an-

nounced that the Bank of England would rediscount on certain terms any "approved bill" before it became due; and that acceptors of bills would be given time in which to make payment but would be required to pay 2 per cent above bank rate for the privilege of extension. The government suggested that the bank be prepared to approve all bills customarily discounted, "and also good trade bills, and the acceptances of such foreign and colonial firms and bank agencies as are established in Great Britain," with the understanding that the government would guarantee the bank against loss. On September 5 another Treasury statement announced that, owing to the choking of the exchange mechanism by promissory bills, acceptors would be lent funds for paying such bills as they came due, and that any unpaid balance of such loans would not be pressed "for a period of one year after the close of the war." Thus both old and new acceptances seemed amply protected. A further difficulty was met in foreign indebtedness. On November 3 was promulgated a plan to investigate solvent traders and advance them funds up to 50 per cent of the foreign debts due them. Thus every obstacle to the resumption of exchange business was removed. On the Continent similar, but less stupendous, problems were to be met. Moratoria were declared in every belligerent country except Germany, and in some neutral countries for reasons similar to the foregoing. Germany avoided a moratorium mainly because of her isolation and partly by the stoppage of collections on bills owed abroad. In both France and Germany, as in England, the central banks were permitted to greatly enlarge their note circulations and thus expanded to unprecedented figures their rediscounts for other banks. See **MORATORIUM; PANIC, FINANCIAL; REDISCOUNTING.**

The most serious aspect of the American financial situation and the fundamental cause of most difficulties was the stupendous debt owing to Europe upon the outbreak of war. Although this country had normally a trade balance of about one-half billion dollars annually, nevertheless its indebtedness for interest and dividends, for tourists' expenditures, for freight, and other items, changed the great trade surplus into a net debt. Sir George Paish, an international authority who was sent to the United States in October, 1914, by English bankers to expedite the payment of these obligations, estimated their total at \$600,000,000. This included more than \$100,000,000 of short-term loans which ordinarily could have been easily renewed or met by fall exports. Abroad refuge had been taken behind moratoria; and the great central banks of Europe served to pool resources and control operations, while in the United States the new Federal Reserve System was not yet in working order. Although \$45,000,000 in gold was sent to Europe during the last few days of July and the first week of August, sight exchange on London at New York, normally \$4.86 per pound sterling, rose to \$5, then to \$6, and finally to \$7, a height never before approached, and regular exchange was not quoted until September 11. A special factor in aggravating the banking difficulties at New York was the maturing early in the fall of about \$82,000,000 of New York City warrants held in London and Paris. To meet these and to strengthen the city's credit there was provided a loan of \$100,000,000 in gold to



which every bank and trust company in the city but one contributed. At the same time bankers of the country created a "Gold Pool" of over \$100,000,000 to meet urgent mercantile obligations abroad, and to provide gold needed for export. It was composed of contributions from banks in reserve cities in proportion to their gold holdings. It served as a guarantee against the complete collapse of American credit abroad and removed from the banks the necessity of seeking refuge behind an unofficial moratorium. Portions of this fund were shipped to the branch of the Bank of England established at Ottawa, Canada, to serve as a basis for exchange on London. The sharp rebound of trade towards the close of the year, the entrance of the world into the American market for goods and loans made possible the dissolution of the "Gold Pool" in January, 1915.

The exchange situation was made particularly difficult by the great reduction of the export trade, especially the exportation of cotton. Moreover the prosperity of the South was seriously threatened unless some means could be devised whereby cotton could serve as a basis for additional credit. Congress and Secretary McAdoo authorized banks to issue emergency currency on the basis of cotton warehouse certificates. About the same time a plan for a Cotton Loan Pool was devised whereby pledges to supply funds to be loaned through Southern banks to cotton growers were deposited with members of the Federal Reserve Board as individuals. By the middle of November more than \$100,000,000 was thus subscribed. However the considerable revival of the export trade in cotton towards the close of 1914 together with the great improvement of internal trade, and the bracing effect of the establishment of the Federal Reserve System made the cotton pool well-nigh unnecessary. It became inoperative in January, 1915, only \$28,000 having been applied for.

The rates of international exchange reflect the conditions both of trade and of credit. At New York the rate on London was not regularly quoted until September 11, when the cable transfer rate stood at \$4.95, par of exchange being \$4.86. It became still more unfavorable, reaching \$4.975 in the weeks of October 8 and 15. It thereafter fell steadily, reaching par on December 22. It continued to fall until early September, 1915, when it reached \$4.63. It was partially restored by the Anglo-French loan, but only for a brief period. In December the British government began to borrow or purchase American and Canadian securities owned by English citizens with a view to their use as security for loans to be advanced by American bankers as a means of preventing further declines in the rate of exchange. About the same time the importation of certain luxuries was prohibited for a like reason.

At Paris the rate of exchange was slightly unfavorable to London during the first half of October, no rates being quoted during August and September; it gradually declined until November 26 and thereafter rose continuously, reaching par again Feb. 19, 1915. It thereafter continued to become slightly more unfavorable to Paris with every passing week. In May, 1916, Finance Minister Ribot began the collection of American, Swiss, Dutch, Scandinavian, and South American securities to be used as a basis for credits for equalizing exchange with the

United States. At the same time the government announced a long list of articles the importation of which was prohibited partly to affect exchange rates.

Almost from the beginning of the war rates of exchange were unfavorable to Berlin. The slight volume of foreign trade and the adjustment of outstanding accounts early brought the rates to considerable stability. Nevertheless the continued purchases in neighboring neutral countries and the steady inflation of German currency brought about a decline of German credit in the later months of 1915. Thus the exchange rate at New York had been only 14 per cent unfavorable until November, 1915, when it dropped rapidly to 26 per cent unfavorable. Similar rapid declines brought about rates unfavorable by 38 per cent at Amsterdam, and by 28 per cent at Zurich.

As stated above the New York Stock Exchange was forced to close very quickly after the closing of the London Exchange. This naturally disturbed the banking situation since considerable loans were based on stock as collateral. Such collateral is generally most fluid of all, but with its market closed it became quite solidified. The banks, however, gradually readjusted affairs without forcing repayment of loans or otherwise unduly disturbing a delicate situation. The reopening of the Exchange was delayed in part to prevent the resumption of the pressure of European sellers and the consequent increase of foreign obligations. The Exchange declared the level of prices on July 30 the official minimum, and on this basis some transactions were carried through under the direction of a Committee of Five. In this manner more than \$100,000,000 of bonds and 250,000 shares of stock were transferred by the end of November. In Philadelphia public auction sales of stocks and bonds were held at various times, prices ranging not far below those of July 30. Gradually at New York the scope of exchange business was enlarged; transactions in a restricted list of bonds were begun on November 28; and two weeks later trading in 181 specified stocks with definitely established minimum prices was begun. The total dealings, however, on the New York Exchange aggregated only 47,899,000 shares for the year 1914, slightly more than one-third those of 1912.

With the opening of 1915, however, pessimism gradually disappeared under the revival of business and was replaced by waves of speculative fever in the stock market. This was notably true in April when 21,000,000 shares were transferred, and in August, September, and October, 26,000,000 shares being transferred in the latter month. The shares of the munitions companies were popularly known as "war brides." Many of these stocks made most phenomenal advances in price during the year. Less speculative interest was shown in the stocks of numerous companies manufacturing supplies the demand for which had been greatly stimulated by the conditions of war. Moreover the great increase in the volume of railway traffic, which towards the close of 1915 amounted to an unprecedented congestion of freight and the refusal of numerous roads with terminals on the Atlantic seaboard to receive additional goods for export during certain periods, resulted in advances in railway stocks. This revival of business did not occur soon enough to prevent a very large amount of railway mileage from

going into the hands of receivers, but railway stocks in general showed advances of 10 to 20 points. In the year 1915 fewer miles of new railways were built than in any year since 1864; in October, 1915, more miles were in receiver-ships than ever before; and yet in the early months of 1916 earnings were never larger.

The bond market likewise reflected the great abundance of capital seeking investment. While advances in bond prices were not remarkable, there was a general upward movement ranging from 1 to 6 per cent during 1915. Moreover the easy money market resulted in the ready flotation of an unusual amount of public and corporation bonds. In consequence of these conditions the total number of stock shares exchanged in 1915 was greater than in any preceding year since 1909.

In addition to the foregoing the American market absorbed an astonishing volume of securities previously held by foreign investors. At the opening of the war the par value of American corporation securities owned abroad was variously estimated at from \$4,000,000,000 to \$6,000,000,000. The most authoritative estimate showed that \$620,000,000 of these securities were repurchased during the first five months of 1915; the estimate for the entire year was that not less than \$1,000,000,000 of such stocks and bonds were transferred to American investors.

**Currency.** Every country in war time experiences an irresistible demand for increases in credit instruments. Not only do governments issue treasury notes but banks are certain, as in times of panic, to increase their note issues. In England there was much discussion of a proposed "suspension of the Bank Act," meaning a proposal to permit the Bank of England to expand its note circulation without increasing its reserves. The steps devised for reestablishing foreign exchange obviated this measure, though Bank of England circulation was expanded and a large volume of £1 and 5s treasury notes were issued. A law of August 7 made not merely these treasury notes legal tender but also postal money orders. Provision was also made for the issue of certificates, like clearing-house certificates, for the settlement of bank balances. Finally the currency and Bank Notes Act authorized the Bank of England to issue to depositary banks notes up to 20 per cent of their deposits and current balances. (See PANIC, FINANCIAL.) In May, 1916, the bank held \$140,000,000 in gold against over \$500,000,000 of paper. The bank, however, owing to its command of the entire gold production of South Africa amounting to about \$200,000,000 per year, was enabled to make extensive gold shipments to the United States and at the same time maintain its credit unimpaired. In France the government authorized practically unlimited issues by the Bank of France and various promises of the government were issued. (See below, *Cost of the War*.) It was estimated that whereas the actual inflation in England amounted to about 144 per cent by December, 1915, it was 157 per cent in France. In Germany, as explained below, the *Darlehnskassen* and the *Kriegskreditbanken* notes were based on property of various kinds. These tended to drive gold and silver out of circulation so that the government authorized the Reichsbank to issue its own notes in exchange for them. At the same time, however, the bank was instructed

to refuse to pay out gold for its own notes, but a vigorous effort was made to increase the bank's gold reserves. This reserve was thus increased from about \$300,000,000 in July, 1914, to \$610,000,000 in January, 1916. But the notes for which the bank was responsible had increased from \$475,000,000 to \$1,560,000,000. Austria and Hungary likewise went speedily to a paper basis.

The breaking down of the mechanism of international credit seemed certain to produce a panic in American banking circles. The American banking system was individualistic and proverbially weak under strained credit. It failed to supply additions to the currency at times when most needed. The Federal Reserve System was particularly designed to remedy this weakness, but in August, 1914, this system had not been finally established. After a conference of bankers and the Secretary of the Treasury at New York on August 2 it was decided to issue emergency currency under the Aldrich-Vreeland Act as modified by the Federal Reserve Act of 1913, and to issue in addition clearing-house certificates. Congress responded to the situation by hurriedly enacting a law reducing the tax on emergency notes for the first three months to 3 per cent and increasing their limit to 125 per cent of capital and surplus. Moreover State banks affiliated with the reserve system were authorized to take out notes; and cotton and tobacco warehouse receipts were made a legal basis for note issues. In consequence more than \$250,000,000 of emergency currency had been issued by September 1; a total of \$384,500,000 of such notes was issued by December 1. Very little publicity was given to the issue of clearing-house certificates in principal banking centres of the country, but \$250,000,000 of them were issued. Practically all of the emergency currency and the clearing-house certificates were retired by the end of January, 1915. Meanwhile the banking and credit situation had been materially strengthened indirectly by the revival of trade and directly by the final establishment of the Federal Reserve System, which was in full working order by Nov. 20, 1914.

**Employment and Wages.** In every nation the opening of hostilities brought on a temporary paralysis of trade, making the problem of unemployment acute in every belligerent country. Special committees, national and local, and special relief funds were created to meet the situation. The gradual readjustment of industry to a war basis and the recruiting of vast armies, however, very soon solved the problem. In Great Britain the labor problem was greatly complicated by the requirements of international trade. There were not merely the demands of the army and navy for equipment and munitions, but the immense difficulty of paying for greatly increased imports from countries to which exports were reduced. This difficulty was greatly increased by the requirement that Great Britain aid in financing her allies and colonies. Consequently the raising of an army at home was directly counter to her financial and commercial demands. The general effect of war on labor was stated by Gladstone to be an immense stimulus during war with enlarged employment and rise in wages, but excessive labor competition, severe unemployment, and reductions in wages when war is over. The truth of the first part of this statement

was made manifest in 1914. Very shortly in every country there was less unemployment than in times of peace, labor shortage actually became acute, wages advanced, and great numbers of women were drawn into unwonted industrial pursuits.

At the outset Great Britain was more unfavorably situated with regard to the manufacture of munitions of war than France, Germany, or Austria. Except for a few scattered private firms, a few small governmental establishments working for both army and navy, and the Woolwich Arsenal employing about 10,000 men, she had no munitions factories operating in July, 1914. Nevertheless 18 months later the entire country was dotted with such factories, their creation being one of the striking phenomena of the war. The astounding demands early aroused the existing arm makers to the highest pitch of activity, but it early became evident that the output of existing plants would be inadequate. By February, 1915, it became manifest that heroic measures must be adopted to secure an adequate output. Out of the delays and confusion resulted a ministerial crisis in May, 1915, which led to the formation of the Ministry of Munitions with Mr. Lloyd-George as its head. This sought to develop the latent capacities of manufactures in engineering and mechanical trades. The entire country was divided into eight munitions districts, besides two in Scotland and two in Ireland, with committees in principal towns. In March the Defense of the Realm Act had authorized the government to commandeer any factory for war purposes. Under this Act many old plants had already been transformed and new ones built, equipped, and manned. The Ministry of Munitions was needed, however, to bring order out of existing chaos by centralizing responsibility and control. It systematically investigated and listed every available factory and private resource. By the close of 1915 there were in addition 33 national shell factories employing from 300 to 1000 persons each, which had been created at government expense by adapting existing establishments. At the same time a number of national projectile factories were being completed to manufacture ammunition for a new type of heavy gun. Gradually the staff of the munitions office, including over 3000 persons divided among numerous departments, was brought to a high state of efficiency. From the first a source of great embarrassment was the inadequacy of skilled labor and its attitude towards the training and employment of unskilled workers. This problem was intensified by the enormous enlargement of the munitions industry, and was not alleviated by extensive advertisement for machinists in the United States. It was estimated that early in 1916 this business alone employed not less than 1,000,000 workers. Among these were included about 300,000 women who were found in England, as in France and Germany, to be capable of performing practically every kind of labor required in munitions making. The organized skilled workers objected to the "dilution" of the shops by unskilled and semiskilled workers, and resorted to strikes and other interruptions. Acts of Parliament very considerably reduced the privileges of labor to leave work and to transfer at will, but special boards for adjusting demands were created and elaborate rules were established to protect the health of the workers, especially of women and children.

Statistical measures of the amount of unemployment were not wanting. The *Labor Gazette* gave the percentage of trade-union members unemployed in June, 1914, as 2.4; it rose to 7.3 in August, and declined steadily thereafter to 2.5 in December, 1914, and to 0.5 in February, 1916. Wages showed little advance before January, 1915, but in February moved sharply upward in engineering, shipbuilding, railway service, docking, and carting, and thereafter the advance spread to all lines. The dearth of skilled labor resulted in many labor tangles, but the government and trade-union officials succeeded in maintaining an unusual degree of industrial peace. The number of trade disputes in 1914 was 999, involving 448,529 workers and a loss of 10,111,337 days of work; while in 1915 they numbered only 674, involving 445,936 workers and a loss of only 2,929,700 days of work.

The French Ministry of Labor reported that in August, 1914, only 48 per cent of establishments and 58 per cent of workers were employed. There was, however, a continuous improvement. By October, 1915, 81 per cent of establishments and 98 per cent of workers were employed. In metal manufactures and transportation new workers had been employed in numbers nearly sufficient to offset those with the colors; and this was partially true of food and chemical industries. But in printing, wood-working, building, glass and pottery making, and precious metals the numbers employed at the later date were less than half the peace normal. As in England women were drawn in great numbers, not only into munitions manufacture, but into many lines of industry, agriculture, and transportation.

In Germany the general course of events was very similar to that in England and France. The general dislocation of industry at the outbreak of the war brought into operation concerted action not merely to relieve unemployment but to shift industry to a war basis. The amount of unemployment among trade unions was 22.4 per cent at the end of August, 1914. It dropped to 15.7 per cent by the end of September, and continued steadily downward to 7.2 per cent at the end of December. This, however, was sufficiently above normal to require a special appropriation of \$125,000 per month by the city of Berlin to relieve unemployment during the winter of 1914-15. By May, 1915, trade-union members unemployed numbered only 2.9 per cent; by September, only 2.5 per cent, at which percentage it remained until February, 1916. As in other countries all trades engaged directly or indirectly in the production of military supplies were unusually prosperous, were employing unusual numbers of workers, and paying higher wages than before the war. But among hat makers, printers, lithographers, bookbinders, wood workers, and porcelain workers the percentage of unemployment was considerably higher than normal. The employment of women was very extensive; their number in unaccustomed pursuits reached 500,000 by July, 1915; they were found in nearly every branch of industry.

The effect of the war upon American industrial conditions was most remarkable. The impetus of the new demands set up by the war began to be felt before the close of 1914. Early in 1915 feverish activity began in various branches of the iron and steel industry, in the

production of copper, lead, spelter, and other metals, and in all branches of munitions manufacture. From these industries the impetus gradually spread to all allied industries and to those engaged in manufacturing such articles as automobiles, railway supplies, boots and shoes, blankets and woolen goods, and food products. While in the fall of 1914 unemployment had been extensive, this problem gradually disappeared, with the result that by the middle of 1915 there was an actual scarcity of labor in many lines, especially skilled labor, and wages had begun to advance. Consequently by the fall of 1915 the tremendous stimulus to American industry had reached all branches of the retail trade. Estimates of war orders placed in the United States during 1915 varied widely, ranging all the way from \$1,000,000,000 to \$2,000,000,000. During the early months of 1915 the Allies were victimized extensively by smooth, self-constituted, and often irresponsible agents of manufacturers, and by other speculating intermediaries seeking fortunes in commissions on war orders. Occasionally the Allies were defrauded by the manufacturers themselves. In all of this immense war business there was a feverish haste and a recklessness in expenditure that involved much waste. This was reduced, however, by the development by the Allies of regular channels for placing orders and by an elaborate and extremely thorough system of inspection of products.

**American Foreign Trade.** Not only did the Allies resort to the United States for unprecedented quantities of goods of numerous kinds, but Secretary of Commerce Redfield pointed out in his annual report for 1915 that the demands of Canada, Central and South America, India, the Near East, South Africa, and indeed every part of the world for American goods had increased. The impetus of this world-wide demand was scarcely felt during 1914. Consequently the exports in that year differed very little from those of the preceding years, being slightly less than in 1912 or 1913. For the calendar year 1915, however, the exports reached the remarkable figure of \$3,547,480,372. This was an excess over imports of \$1,768,883,677, an excess more than two and one-half times that of the previous maximum in 1913. Net importations of gold aggregated \$530,000,000 in 1916, as compared with net importations of \$420,000,000 in 1915. The imports from Jan. 1, 1916, to Jan. 1, 1917, were approximately \$2,350,000,000 and the total exports during the same period were \$5,475,000,000.

The immense volume of American export trade created an unprecedented situation in the shipping world. By the fall of 1915 the quantity of goods for export actually exceeded the carrying capacity of merchant vessels available, in spite of great advances in freight rates and the utilization of every type of craft however old. British experts pointed out that their government had requisitioned for war purposes not less than 50 per cent of the entire British merchant fleet. German submarine activities had destroyed about 6 per cent. Moreover the large German merchant marine was practically nonexistent. Consequently freight rates first doubled, then trebled and quadrupled, and in special cases advanced as much as 900 per cent by the spring of 1916. In some instances a vessel would earn its entire cost on a single round trip. Antiquated steam vessels were selling at prices from two to five times their value before

the war; consequently there developed unprecedented activity in American shipbuilding yards. By April 1, 1916, orders had been given for 360 vessels with a tonnage of more than 1,000,000, and 6,000,000 were expected in 1918.

**World Trade.** The war seemed destined to have permanent and far-reaching effects upon the world's commerce. In America active measures were begun before the close of 1915 to strengthen the American hold upon new markets and to increase coöperation in foreign trade after the war. On Dec. 1, 1915, e.g., was organized the American International Corporation, with \$50,000,000 capital. Its purpose was to develop trade connections in foreign countries and promote the investment of American capital abroad. Its organization was led by the National City Bank, which was then engaged in establishing branches in principal South American countries. This bank also had acquired control of the International Banking Corporation with 16 banks in China, Japan, India, the Philippines, and Panama. The Bureau of Foreign and Domestic Commerce and the Federal Trade Commission and numerous business organizations devoted much attention to the furtherance of all efforts to secure a firm grasp of markets previously held by English and German traders. Similarly plans were formulated early in 1916 for systematic study of the demands of Europe during the period of reconstruction following the war. Among the Allies every effort was made to stamp out every trace of German economic penetration, and plans were formulated for reducing German competition upon the restoration of peace. On April 23, 1916, there opened in Paris the International Parliamentary Economic Conference of the Entente Allies for the discussion of trade agreements and legislative measures designed to reduce German competition and facilitate trade among the Allies and their colonies. From Germany it was reported that systematic measures were being taken to prosecute most vigorously efforts to regain lost trade.

**Foreign Credits.** The commanding importance of the United States as the greatest neutral market of the world made it for the first time in its history a lender on a large scale. During 1915 loans aggregating \$1,000,000,000 were contracted in America by foreign governments, more than four-fifths of the proceeds being expended there for war supplies. Loans to the Canadian Dominion government, eight provinces, and 10 cities aggregated \$147,000,000. Argentina borrowed \$64,000,000; Switzerland, \$15,000,000; Sweden, \$5,000,000; Norway, \$8,000,000; Greece, \$7,000,000; notes of the German Treasury to the amount of \$10,000,000 were sold to American investors. Russia secured loans for \$92,000,000; Italy borrowed \$25,000,000; but the great loans were those contracted by France and Great Britain. In addition to the Anglo-French loan of \$500,000,000, France secured \$75,000,000 on notes, bonds, and collateral; and London banks borrowed \$50,000,000. The purpose of these loans was to equalize rates of exchange, but in spite of them and extensive gold shipments sterling exchange declined to \$4.63 by September, 1915. It was therefore necessary for British financiers to restore a more normal rate. In that month a commission of British and French financiers came to the United States to establish a credit for \$750,000,000 or even \$1,000,000,000. The sum, how-

ever, was reduced to \$500,000,000 after various conferences. A syndicate was formed led by J. P. Morgan and Company which took the loan at 96 or on a basis to yield an average of 5.75 per cent. Early in 1916 Argentina secured an additional \$15,000,000; and Canada, \$75,000,000.

**Prices and Food Supplies.** Inevitably the war had a far-reaching effect upon the movements of prices throughout the world. War not only destroys existing property, but it requires the creation and consumption of goods in amounts immensely greater than the demands of peace. All sorts of raw materials are required in unprecedented amounts and their prices together with those of products made from them rise correspondingly. The most striking advances were those of copper, nickel, lead, zinc, and all kinds of steel products, together with the various constituents used in the manufacture of explosives; but even more important in their effect upon the general welfare of the inhabitants not only of belligerent but of all other nations was the rise in the prices of food products. Thus, e.g., the price of copper rose from about 12 cents to nearly 30 cents per pound; cotton doubled in value; and food prices rose so extensively that administrative measures to regulate them were undertaken by Austria, Bulgaria, Denmark, Egypt, France, Germany, Great Britain, Greece, Holland, Italy, Norway, Russia, Serbia, Spain, Sweden, Switzerland, and Turkey. Most of these countries prohibited the exportation of foodstuffs. In most of them municipal authorities either alone or in conjunction with national or military authorities fixed maximum prices.

The actual extent of the rise in prices is best indicated by index numbers. For the United States *Bradstreet's Index* rose from \$8.7087 on August 1 to \$9.8495 on August 15, 1914. It dropped during the next 10 weeks and thereafter rose steadily to \$11.7598 on April 1, 1916. In Great Britain an astonishing rise in the price of coal resulted in the appointment of a commission of investigation in March, 1915. This body found that the increase of 100 per cent or more was a natural consequence of the recruiting of nearly 250,000 miners and increases in cost of transportation. According to the *Board of Trade Labour Gazette* retail food prices advanced from July, 1914, to March, 1916, by 45 per cent in small towns and 51 per cent in large towns, an average of 48 per cent for the United Kingdom.

The greatest interest attached to the question whether Germany could be starved into submission. Normally the annual excess of German food imports over exports is considerable. In 1912 and 1913 this excess amounted to 2,000,000 tons of wheat, 3,000,000 tons of barley, 1,000,000 tons of corn, and 500,000 tons of rice and potatoes. There are normally also large imports of meat and animal products, oil cake, and fodder. Imports amounted to about 40 per cent of the annual consumption of meat products, and 20 to 30 per cent of grains and vegetable products. The war cut off most of the imports; the campaigns in East Prussia and Alsace destroyed crops; agricultural labor was reduced; North Sea fisheries were closed; and Chile fertilizer no longer available. Nevertheless considerable supplies were still derived from Holland, Scandinavia, and Switzerland, and through military and diplomatic operations large supplies of grain and fodder were procured

from Bulgaria and Rumania. Moreover the entire economic resources of the Empire were mobilized by the early creation of an economic general staff, "The Division of Raw Materials of War," which reorganized industry, reduced consumption, reclaimed old materials, utilized by-products, created new materials and new chemical and industrial methods, erected factories, controlled goods seized by the armies and had great powers of appraisal and price fixing.

By January, 1915, the extravagance of many consumers, the speculation in food prices, and the manipulation of food supplies and markets induced the government to extend its control. On January 25 it was decreed that all supplies of wheat and rye should come under control of the War Grain Association; and local supplies were placed in charge of Communal Associations. The consumption of cereals was brought under the supervision of an Imperial Distributing Bureau. In February a system of regulating the bread supply by bread cards, which limited the weekly consumption of each individual or family, was instituted. With the passage of time similar regulations were extended to meat and vegetables, and finally in May, 1916, the control of all food supplies was placed in charge of a "food dictator" or government bureau. While the best statistical evidence seemed to indicate that food supplies were sufficient to meet minimum requirements there was some evidence that high prices led to serious food riots and much popular discontent late in 1915 and in 1916. According to the Prussian official *Statistische Korrespondenz* the prices of 20 important food products rose 88.5 per cent from July, 1914, to Feb. 1, 1916.

In Vienna official reports showed an advance of 112.9 per cent in 17 important foods from July, 1914, to December, 1915. In Italy the general level of food prices was 31.2 per cent higher in December, 1915, than in July, 1914. The official index of retail food prices in Australia advanced 31 per cent from July, 1914, to July, 1915; 39 per cent to August, 1915; and then fell, being 31 per cent higher in November, 1915, than in July, 1914. In New Zealand general prices rose 30 per cent from August, 1914, to December, 1915, inclusive. Official publications showed that in Copenhagen the cost of living rose 24.2 per cent from July, 1914, to February, 1916; for food prices alone the advance was 33.4 per cent.

**Cost of the War.** The real cost of war should be measured in terms of the sacrifices of the people engaged in it and of the rest of the world. Such sacrifices would include not merely the loss of lives of those killed in combat, the sufferings of the wounded, and the increased death rate both during and after the war consequent upon injuries and deprivations, but also the labors, hardships, and sufferings imposed upon the soldiers and the non-fighting population both during actual hostilities and during the long years of recuperation thereafter. It is evident that such a cost cannot be computed. Even when measured in financial terms the cost should include not merely the huge public expenditures but also the dislocation, misdirection, and destruction of productive power, both of labor and of capital, and the destruction of private and public property, works of art, and great historical landmarks. It is evident that these latter items can be only

roughly approximated. Consequently the cost of war is usually stated in terms of governmental expenditures.

The following tables from *The Wall Street Journal* give a statement of the war loans of both belligerents and nonbelligerents up to March 1, 1916. The first table states in thousands of dollars (i.e., 000 omitted) the debts of belligerents before the war and on March 1, 1916. In the case of Germany the debts of both the Empire and the states are included; and the war loans of France include advances from the Bank of France.

COUNTRY	Pre-war debt	War loans	Present debt
Great Britain....	\$3,485,000	\$7,670,000	\$11,155,000
France.....	6,607,000	6,590,000	13,197,000
Russia.....	4,537,000	4,117,500	8,654,500
Italy.....	2,336,000	1,465,000	4,301,000
Total for Allies.	\$17,465,000	\$19,842,500	\$37,307,500
Germany.....	5,198,000	6,415,000	11,613,000
Austria-Hungary..	3,970,000	2,547,500	6,517,500
Turkey.....	640,000	214,000	854,000
Central Powers	\$9,808,000	\$9,176,500	\$18,984,500
Grand total..	\$27,273,000	\$29,019,000	\$56,292,000

The approximate per capita indebtedness on March 1 was: Great Britain, \$242; France, \$330; Germany, \$177; Austria-Hungary, \$159; Italy, \$87; and Russia (in Europe), \$57.

The daily cost of war gradually increased from less than \$40,000,000 per day at the beginning to fully \$122,500,000 per day to January, 1918. The following table estimates total and daily costs.

COUNTRY	Cost to Jan. 1, 1918	Daily cost
Great Britain.....	\$27,236,500,000	\$32,500,000
France.....	18,405,000,000	17,000,000
Russia.....	14,340,000,000	16,000,000
Italy.....	7,650,000,000	10,000,000
Other Allies	2,165,000,000	3,000,000
Total for Allies..	\$69,796,500,000	\$78,500,000
Germany.....	24,455,000,000	27,000,000
Austria-Hungary..	10,475,000,000	15,000,000
Turkey and Bulgaria	1,755,000,000	2,000,000
Central Powers....	\$36,685,000,000	\$44,000,000
Grand Total..	\$106,481,500,000	\$122,500,000

The loans of the various belligerents from the beginning of the war to March 1, 1916, aggregated over \$29,000,000,000. Of this enormous sum the Allied Powers had contracted 68 per cent and Great Britain alone 26 per cent or more than one-fourth. British loans included the first war loan of \$1,750,000,000 of 3½ per cent bonds on a basis of 3.97 per cent; the second war loan of \$2,925,000,000 of 4½ per cent bonds on a basis of 4.58 per cent; and treasury bills of over \$2,000,000,000. There were also included loans for Canada, India, and Australia aggregating over \$260,000,000, one-half of the Anglo-French loan in the United States, and advances to Allies and colonies exceeding \$2,000,000,000. In addition to the above the English Chancellor of the Exchequer had announced in February, 1916, that an additional war credit of \$2,500,000,000 was immediately needed, bringing the English total of loans to

over \$10,000,000,000. The principal item for France was the Loan of Victory of 5 per cents at 87 to yield 5.75 per cent aggregating \$3,100,000,000. There were advances from the Bank of France to Feb. 17, 1916, of \$1,120,000,000; bonds and notes in London of \$506,000,000; and one-half of the Anglo-French loan, besides notes and banking credits in New York amounting to \$80,000,000. France had also issued national-defense bonds to the amount of \$1,392,584,000. Russia had issued four internal loans aggregating \$1,545,000,000; 4 per cent bonds to the amount of \$309,000,000; treasury bills at 5 per cent aggregating \$1,364,750,000; and had contracted loans in England, France, Japan, and the United States to complete her total. In Italy there had been three issues of 25-year bonds bearing 4½ or 5 per cent in the aggregate amount of \$1,190,000,000. In addition she had contracted obligations in England for \$250,000,000 and in the United States for \$25,000,000. France and England had advanced to Belgium \$218,000,000. Japan issued a loan for \$26,000,000 in 1914. Serbia had secured \$33,000,000 from France.

The German loans began with a 5 per cent issue at 97.5 in September, 1914, to the amount of \$2,125,000,000. A second issue of 5 per cents at 98 in May, 1915, totaled \$2,250,000,000. A third in September, 1915, at 99 aggregated \$3,000,000,000. The fourth loan bearing 5 per cent interest, the books for which were closed in April, 1916, reached \$2,500,000,000. Special banks (*Darlehnskassen*) were established by the government for the purpose of advancing money on securities of various kinds, such money to be invested in the loans. Similar advances of paper money (*Darlehnskassenscheine*) were made on goods for export but unable to leave Germany during the war. In some cases even pledged property, household goods, and instruments of trade could be mortgaged to these banks in order to secure funds for investment in the war loans. In the second loan the bonds of the first loan were accepted in part payment; but the amount of such transactions was not published. In the third loan the government exchanged its obligations for contracts of manufacturers and traders to deliver to the government goods of a specified value. It was believed by many that the slight resort to taxation, the great expansion of paper currency, and excessive use of credit were unsound methods of war finance.

The Austro-Hungarian loans included a first, second, and third Austrian loan aggregating \$1,782,000,000 and a first and second Hungarian loan aggregating \$471,000,000 besides loans contracted in Germany to the amount of \$298,500,000. The actual expenditures, however, of the Dual Monarchy were somewhat shrouded in mystery. In floating their loans special banks and methods similar to those adopted in Germany were used. Turkey contracted two loans in Germany amounting to \$214,000,000; and Bulgaria obligated herself to German bankers to the extent of \$30,000,000.

In addition to the foregoing various neutral countries had been forced to contract loans by the added expenditures made necessary by the war. These amounted to \$143,000,000 in Holland; \$40,000,000 for Rumania; \$25,000,000 for Egypt; \$51,000,000 for Switzerland; \$28,000,000 for Denmark; \$24,800,000 for Spain; \$16,000,000 for Norway; \$14,380,000 for Sweden; and \$8,000,000 for Greece.



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## **COURSES OF READING AND STUDY**



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# Preface

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**T**HE purpose of the present volume, as its name suggests, is to offer help towards self-instruction in the various arts and sciences, utilizing the *New International Encyclopædia* as a general text-book. There is little need to emphasize in this place the rôle of popular educator played by a work like the Encyclopædia. This has been long recognized; and, from a mere work of reference consulted at odd moments for fragments of information, the modern Encyclopædia has become in thousands of homes a source of common culture, the basis of a thorough training in the principles and facts of History, Law, Literature, the Fine Arts, Religion, Biology, Engineering, Physics, Chemistry, or Agriculture. Especially where access to large libraries is difficult or impossible, its value is apparent. In every department of human knowledge, it speaks with a copiousness unequaled in the average text-book and a degree of authority attainable only when every department, and subdivision of a department, is covered by an acknowledged specialist in the field.

A glance at any chapter in the book will show the method pursued. The aim has been to make every chapter a complete summary of the subject with which it deals by arranging the material as the reader or student would find it arranged in a systematic treatise on the subject. The amount of text in each chapter has necessarily been reduced to a minimum, only so much being given as is essential to trace the connection between the successive groups of titles. But, when it is considered that every title in every group represents from two or three hundred to fifteen thousand words of text, the completeness of treatment will be realized.

Within the chapter the material has been divided and subdivided in such a manner as to facilitate study on special topics. If the reader, for instance, desires to make himself particularly well acquainted with a certain period in American History, he need but turn to the proper section in Chapter I., where the subject of American History is outlined in five sub-headings with as many groups of titles; and at the end of the section on American History he will find a list of authorities in whose works he may carry on supplementary reading to any extent. In the same manner, a person interested in the ceremonial or hymnology or clerical vestments of the Roman Catholic Church will find these topics treated in related groups of titles as a section in the chapter on Religion. Under Chemistry one may study the entire subject, carefully outlined for such a purpose, or may concentrate on the acids or the salts or the fats. In every chapter, the technical exposition is supplemented by comprehensive lists of biography wherein the historical aspect of the subject finds complete treatment.

In quoting titles in the lists, the form given is that, of course, which appears in the Encyclopædia; as, CRUELTY TO CHILDREN, PREVENTION OF; or, MACHINERY, ECONOMIC EFFECTS OF. Where reference is made to a long article, the particular section is indicated; as, "See section *The Renaissance* under SCULPTURE," in which case, the reader will turn to Sculpture in the Encyclopædia. In the biographical

titles, the full Christian name, or the corresponding initials, is given as a rule; as ADAMS, SAMUEL; ADAMS, H., KIPLING. The alphabetic arrangement of titles in the *Encyclopædia* makes reference to volume and page obviously superfluous.

It is in its orderly marshalling of the material contained in the *Encyclopædia* that we believe the value of this book consists. It is quite unlikely that the average reader, left to his own guidance, will plan his course in such a manner as to produce the fullest results with the least waste of time. Where the subject is unfamiliar, he is as apt at the start to hit upon the middle of it as upon the beginning, and, in passing from article to article, there is always the danger of his missing the logical sequence of topics. A mere index would here be useless. What is necessary is a carefully planned outline that shall lead the reader, step by step, from elementary principles to the most specialized treatment. Such a guide this Outline aims to be.

The preparation of this volume, carried on under the supervision of the Editors, has been in the direct charge of Mr. SIMEON STRUNSKY, of the staff of the *New International Encyclopædia*, and the supervision of the revision for the second edition under the charge of Mr. IRWIN SCOFIELD GUERNSEY.

—THE EDITORS.

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# Chapter 1. History

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**H**ISTORY, which we may define as the record of man's life on earth and the sum of his achievements, would include in its broadest aspect the entire story of human development from Palæolithic man to the present day. As a matter of convenience, however, in this book we shall leave the beginnings of associated human life to be treated under the heading of Anthropology and Ethnology, where, too, will be found the material for the stories of those peoples and tribes which to the present day have remained without the pale of our civilization. Here we shall take up the narrative at a point in time when we first catch a glimpse of the nations whose culture, evolved during thousands of years, and passed on from hand to hand, has become the heritage of the present day. The traditional division into Ancient, Mediæval, and Modern history is followed, and in accordance with custom the account begins with the nations of the Mesopotamian region, and passes on through Persia and the empire of Alexander into Rome, where also the course of Egyptian, Jewish, Phœnician, and Greek history, taken up in turn, leads us. With Rome, Ancient history ends. India, China, and Japan, though their history goes back to a past coeval with the period we call ancient, are treated apart because of their far less intimate connection with the civilization of Europe, wherein our interest is centered. Mediæval history takes up the story at the fall of Rome, traces the amalgamation of the old world with the new, the growth of the Church, the rise of States, and the transition, through inward development and outward contact with Asia and America, to modern times. There European history becomes largely the story of nations and their conflicts. One by one due treatment is accorded them, the field widening as Australia, Africa, and Asia come within the scope of European interests. The record ends with a section on the history of the United States outlined with greater detail than the account of other lands.

First some conception of the methodology of historical writing and a bird's eye view of the history of the world may be useful, for which see:

History  
Asia  
Europe

Africa  
America  
Australia

## A. Ancient History

### 1. BABYLONIA, ELAM, AND ASSYRIA.

Archæological research has carried back the origin of Sumerian and Akkadian civilization to the fifth millennium B. C., given us a fairly continuous history of Babylonia, Elam, and

Assyria, and revealed something of the literature, science, art, laws, and social life of these countries. Babylonia was ruled at times by Gutians, Elamites, Kassites, Assyrians, and Chaldeans, but always exercised a power-



ful cultural influence. The Assyrians established an empire that finally included Elam, Mesopotamia, Syria, and Egypt. A part of it fell to the Chaldean kingdom, which was conquered by Cyrus in 539 B. C. **Sec:**

(a) For the Land:

Mesopotamia  
Euphrates  
Tigris  
Babylonia  
Assyria  
Arrapachitis  
Adiabene  
Shinar  
Elam

(b) For the Cities:

Nippur  
Babylon  
Calah  
Ur  
Erech  
Nineveh  
Assar  
Khorsabad

(c) For the Kings:

Sargon  
Hammurapi  
Shalmaneser  
Tiglath-pileser  
Asurnazirpal  
Sennacherib  
Esarhaddon  
Sardanapalus  
Nabonassar  
Nabopolassar  
Nebuchadnezzar  
Belshazzar  
Cyrus

(d) For the People, Religion, and  
Language:  
Sumerian Language

Chaldeans  
Kassites  
Amorites  
Mitannians  
Merodach  
Ishtar  
Semitic Languages  
Babylonian Art  
Assyrian Art  
Cuneiform Inscriptions

(e) For the Historians and Investigators:

Botta, P. E.  
Delitzsch, F.  
Layard, A. H.  
Meyer, E.  
Oppert, J.  
Rassam, H.  
Rawlinson, H. C.  
Sayce, A. H.  
Schrader, E.  
Smith, G.  
Winckler, H.

2. EGYPT.

From the monuments it is evident that the Egyptian civilization was in its origin independent of the Babylonian and goes back to as early an antiquity. From primitive times when the land was divided into two sections, the Delta and the South, we pass through many dynasties of pyramid and temple building kings to a time of subjugation by foreign invaders, of conquests in Palestine and Asia Minor, of decline, and of reduction by the Persians, by Alexander of Macedon, and by Rome. A cheerful people, influenced greatly by their priests, submissive to their kings, worshiping many gods and animals, they left behind them massive structures of which we have not yet the secret. Their

priests read the stars and knew geometry, speculated on the soul, and probably passed on to the Phœnicians the alphabet which was to be ours. (?— B. C. 30) See:

(a) For the Land:

Egypt  
Nile  
Delta  
Nubia  
Ethiopia  
Libya  
Suez Canal

(b) For the Cities and Monuments:

Memphis  
Tanis  
Thebes  
Karnak  
Luxor  
Ramesseum  
Pyramid  
Rosetta Stone

(c) For the Kings:

Menes  
Cheops  
Chephren  
Amenemhat  
Usertesen  
Amasis  
Amenophis  
Thothmes  
Hatasu  
Rameses  
Psammetichus  
Necho  
Amasis II  
Ptolemy  
Cleopatra

(d) For the People, Religion, Language, and Culture:

Egypt  
Hamites

Hyksos

Rê

Horus

Osiris

Thoth

Athor

Ammon

Apis

Set

Isis

Nephthys

Anubis

Hieroglyphics

Egyptian Art

Egyptian Music

(e) For the Historians and Investigators:

Egyptology  
Breasted, J. H.  
Brugsch, H. K.  
Champollion, J. F.  
Lenormant, C.  
Lepsius, K. R.  
Manetho  
Mariette, A. E.  
Maspero, G. C. C.  
Naville, E. H.  
Petrie, W. M. F.  
Renouf, P.  
Rougé, O. C. E.  
Sayce, A. H.  
Wilkinson, J. G.

### 3. PHœNICIA AND ASIA MINOR.

What is now Syria and part of Asia Minor was in the earliest times debatable ground between Egypt and the Mesopotamian monarchies. On the Palestinian coast the Phœnicians, with little territory, developed a splendid industry and commerce and in their ships carried the seeds of Babylonian and Egyptian civilization over the Mediterranean basin. Later, when the

Hyksos were invading Egypt, a people known as the Hittites appear, stout fighters who render a good account of themselves against the Assyrians and Egyptians. Their homes were in Northern Syria and in Eastern Asia Minor, but about B. C. 700 they disappeared, leaving little trace behind them. See:

(a) For the Phœnicians:

Phœnicia  
Sidon  
Tyre  
Acre  
Byblos  
Cyprus  
Carthage  
Hiram  
Melkarth  
Astarte  
Phœnician Art  
Amarna Letters

(b) For the Hittites:

Hittites  
Syria  
Boghaz-Keui  
Eyuk  
Mitannians  
Cappadocia  
Carchemish  
Marash  
Hamath

persecution, escape, conquering for themselves the land of Canaan and passing thereby from the nomad into the agricultural stage. See:

Jews  
Palestine  
Goshen  
Semitic Languages  
Abraham  
Isaac  
Jacob  
Esau  
Amarna Letters  
Exodus  
Moses  
Aaron  
Joshua  
Canaan  
Simcon  
Judah  
Levi  
Gad  
Naphtali  
Issachar  
Dan  
Zebulun  
Ephraim  
Benjamin

Ruled by warrior leaders for a long period, the people finally obtain a king, but after a hundred years the nation breaks into two, the northern, Israel, falling to Assyria, the southern, Judah, 150 years later to Babylonia. The Babylonian exiles return and re-establish the Jewish state in the form of a theocracy based on a purified Yahwe worship. See:

Jews  
Saul  
David  
Jerusalem  
Solomon

#### 4. THE JEWS.

The Jews form the third in the group of peoples lying between Egypt and Babylonia and affected by the influence of both. The Hebrews, a Semitic tribe of nomads, after wandering through the land of Canaan, enter the land of Goshen, a territory belonging to Egypt, are there held in bondage, and, hammered into a nation by

Judah  
 Jeroboam  
 Joash  
 Abimelech  
 Jehosaphat  
 Ahab  
 Josiah  
 Hezekiah  
 Samaritans  
 Babylonia  
 Nehemiah  
 Ezra  
 Cyrus  
 Amorites  
 Philistines  
 Aramæans  
 Ammon  
 Moab  
 Edom  
 Judges, Book of  
 Kings, Books of

Pharisees  
 Zealot  
 Essenes  
 Zadokites  
 Messiah  
 Bar-Kokba  
 Spain  
 Crusades  
 Anti-Semitism  
 Zionist Movement

(b) For the Law, Language, Literature, and Science:

Bible  
 Pentateuch  
 Talmud  
 Gemara  
 Mishna  
 Cabbala  
 Halacha  
 Haggada  
 Midrash  
 Maimonides  
 Yiddish

(c) For the Historians:

Josephus, Flavius  
 Ewald, G. H.  
 Wellhausen, J.  
 Renan, E.  
 Graetz, H.

The reëstablished State passes from the suzerainty of Persia to that of Macedonia, the Seleucid kings of Syria, and Rome, rising against whom, Jerusalem is taken (A. D. 70), the Temple destroyed, and the greater part of the nation scattered over the Roman world. The insurrection of Bar-Kokba in the second century is the last forcible assertion of the national spirit. The Jews now enter upon their historic rôle of wanderers, subject alternately to persecution and favor at the hands of rulers and peoples, and held together as a folk by the Law and the Talmud. See:

(a) Jews

Babylonish Captivity  
 Antiochus  
 Maccabees  
 Herod  
 Sadducees

## 5. PERSIA.

In northeastern Iran, a people, the Medians, shake off the yoke of Assyria in the eighth century B. C. and soon attain power over their former masters, but fall themselves under the domination of the Persians and Cyrus, who brings under his sway all of Mesopotamia and Palestine. Under his successors Persia becomes the greatest empire of pre-Alexandrian times, spreads to the Mediterranean, and enters Egypt, but fights vainly against the Greeks and is conquered by the young

hero of Macedon. The empire falls apart, the heart of it, Persia proper, passing in turn to the Parthians, Arabs, Turks, Mongols, and Turks again, till it remains what it is at the present day, a piece in the game between England and Russia in Asia. See:

(a) For the Land and the People:

Iran  
Media  
Persia  
Asia Minor  
Bactria  
Parthia  
Armenia  
Susa  
Persepolis  
Ctesiphon  
Ecbatana

(b) For the Dynasties and Kings:

Achæmenidae  
Seleucidae  
Arsacidae  
Sassanidae  
Abbasides  
Samani and Dilemi  
Ghaznevides  
Ghuri  
Seljuks  
Astyages  
Cyrus  
Cambyses  
Darius  
Xerxes  
Artaxerxes  
Khosru  
Hulaku Khan  
Timur  
Abbas I.  
Nadir Shah

(c) For the Culture:

Persian Art

Persian Language  
Persian Literature

6. GREECE.

The seeds of culture brought to Greece by the Phœnicians from Babylon, Egypt, and Asia Minor, developed into a new civilization, the highest in many respects the world has as yet seen, which influenced mightily the history of future ages. The legendary accounts, in the tales of heroes and gods, probably reflect historical conditions. See:

Mythology  
Danaüs  
Cadmus  
Hercules  
Theseus  
Minos  
Argonauts  
Trojan War  
Agamemnon  
Ulysses  
Achilles

Greek history begins with a succession of great migrations from the mainland eastward towards Asia Minor. When authentic history begins, Greece appears as an agglomeration of small independent states, in a state of transition from the monarchical form of government into tyrannies, oligarchies, and democracies. See:

(a) For the Land:

Greece  
Asia Minor  
Crete  
Thessaly  
Bœotia  
Epirus  
Attica  
Peloponnesus

Eubœa  
 Lesbos  
 Chios  
 Ithaca  
 Pydnus  
 Olympus  
 Delos

(b) For the Cities:

Athens  
 Sparta  
 Thebes  
 Mycenæ  
 Tiryns  
 Argos  
 Corinth

(c) For the People:

Archæology, II  
 Hellenes  
 Danai  
 Dorians  
 Ionians  
 Æolians  
 Achæans

(d) For the Men:

Lycurgus  
 Solon  
 Pisistratus  
 Clisthenes

Greece  
 Athens  
 Miltiades  
 Marathon  
 Themistocles  
 Salamis  
 Thermopylæ  
 Aristides  
 Leonidas  
 Ephialtes  
 Pericles  
 Conon  
 Nicias  
 Sparta  
 Syracuse  
 Lysander  
 Agesilaus  
 Antalcidas  
 Pausanias  
 Epaminondas  
 Pelopidas  
 Mantinea  
 Leuctra  
 Macedon  
 Philip II  
 Demosthenes  
 Æschines  
 Alexander the Great  
 Chæronæa  
 Antipater  
 Demetrius Poliorcetes  
 Ætolian League  
 Achæan League  
 Philopœmen  
 Pydna  
 Cynoscephalæ

The Greeks, after a long, successful struggle against Persia, won national greatness. Democratic Athens first takes the lead among the Greek city states and for a half century plays a brilliant part, then succumbs to Sparta, which in turn falls before Thebes. Disunion brings Greece under the sway of Macedon, whose young king, Alexander the Great, conquers Persia and Egypt and spreads the Hellenic culture in his new realm. Greece proper is ruled by Macedon till it falls with Macedon under the power of Rome. See:

In the Greek city states the problems of democracy were well worked out, and politics became an exact science. The principles of democracy were carried over the basin of the Mediterranean and the Black Sea, wherever the Greeks, the successors of the Phœnicians as traders and colonizers, went. See:

**(a) For Greek Government :**

Monarchy  
 Tyrant  
 Democracy  
 Aristocracy  
 Despot  
 Ecclesia  
 Arcopagus  
 Ostracism  
 Boule  
 Ephori  
 Archon  
 Solon  
 Lycurgus  
 Lysander

**(b) For the Greek Colonies :**

Ionia  
 Mitylene  
 Ephesus  
 Halicarnassus  
 Chalcidice  
 Colchis  
 Chersonesus  
 Cyrene  
 Sicily  
 Magna Græcia  
 Marseilles

Over all the Greek world the Hellenic culture prevailed as in the home country. See:

Architecture, Greece  
 Greek Language  
 Greek Literature  
 Greek Music  
 Greek Art  
 Greek Philosophy

The Greek religion passed from an unrestrained polytheism into an anticipation of monotheism on the part of the select few, into gross superstition on the part of the many. See:

Olympus  
 Pantheon

Jupiter  
 Juno  
 Apollo  
 Mercury  
 Vulcan  
 Ceres  
 Venus  
 Diana  
 Mars  
 Minerva  
 Neptune  
 Pluto  
 Greek Religion  
 Greek Festivals  
 Games  
 Olympic Games  
 Mysteries

**For the Historians :**

Herodotus  
 Thucydides  
 Xenophon  
 Plutarch  
 Polybius  
 Dio Cassius  
 Dionysius of Halicarnassus  
 Arrianus  
 Theopompus  
 Diodorus Siculus  
 Curtius, E.  
 Finlay, G.  
 Grote, G.  
 Schliemann, H.

**7. ROME.**

Greek civilization was imposed on the peoples of Europe, Northern Africa, and Western Asia by the armies of Rome, whose origin goes back to a settlement of Latin outlaws and shepherds on one of the seven hills south of the Tiber. A legendary kingdom gives way, about the beginning of the sixth century B. C., to a republican

form of government. A long contest between privileged and non-privileged classes results in the elaboration of a splendidly efficient system of municipal government. See:

(a) For the Land and the People:

Rome  
Italy  
Latium  
Italic Languages  
Latini  
Etruria  
Samnites

(b) For the Cities:

Rome  
Alba Longa  
Veii  
Tarentum  
Capua  
Naples  
Brindisi  
Pompeii  
Herculaneum

(c) For the Kingship and the Struggle between Classes:

Romulus  
Numa Pompilius  
Tarquinius  
Comitia  
Patrician  
Plebeians  
Consul  
Tribune  
Prætor  
Censor  
Ædiles  
Senate  
Decemviri  
Hortensius  
Licinian Rogations

conquest and by means of her splendid military art and unscrupulous diplomacy makes herself mistress of Latium, of Italy, and, after a struggle with Carthage, with Macedonia, and with Syria, of the Mediterranean basin. Unchecked power, however, brings corruption within the State, republican institutions tend to become empty forms, factional strife breaks out, the Senate rules for a while and then succumbs to the ambition of masterful politicians; in the conflict of parties the Republic meets its end. See:

Gaul  
Camillus  
Pyrrhus  
Carthage  
Punic Wars  
Hamilcar  
Hasdrubal  
Hannibal  
Hispania  
Cannæ  
Zama  
Scipio  
Macedonia  
Antiochus  
Gracchus  
Agrarian Laws  
Jugurtha  
Marius  
Sulla  
Pompeius  
Mithridates  
Cicero  
Catiline  
Cæsar  
Cassius  
Brutus  
Crassus  
Antonius  
Cleopatra  
Actium

With her internal problems settled, Rome enters upon a career of foreign



The Roman Empire, established by Augustus before the beginning of the present era, attained its greatest extent in the early years of the second century of that era and entered on its decline towards the end of the same century. At its height it embraced within its limits the classic world. Peace, excellent means of communication, and an unrivalled administrative system brought the different parts of the Empire close together and facilitated the spread of Greek culture and later of Christianity. The decline of the Empire, due to the decay of old age and the onset of the barbarian tribes of Northern Europe, is arrested by the reforms of Diocletian and of his successor Constantine the Great, who, in the beginning of the fourth century, makes Christianity the State religion. See:

Augustus  
Tiberius  
Caligula  
Claudius  
Nero  
Vespasian  
Titus  
Domitian  
Trajan  
Hadrian  
Antoninus Pius  
Aurelius  
Commodus  
Severus, Septimius  
Caracalla  
Severus, Alexander  
Aurelianus  
Diocletian  
Prætorian Guard  
Constantine the Great  
Christianity

After Constantine the decline is pre-

cipitate. The ancient Roman prowess is gone, and the defence of the Empire is entrusted to barbarian mercenaries; the task of government becomes too heavy for one man, and the Empire is divided in two. The wave of barbarian migration breaks with full force upon the Western Empire, and the last emperor of Latin Rome is dethroned in 476. See:

Migration  
Parthia  
Julian  
Theodosius  
Stilicho  
Alaric  
Attila  
Huns  
Goths  
Vandals  
Burgundians  
Odoacer  
Ravenna  
Honorius  
Augustulus  
Aëtius

The Romans were preëminent for their political genius; their literature, in part, their philosophy, and their art were copies of the Greek, and the general culture at the time of the Empire's zenith was Hellenistic; their gods, too, were largely borrowed or adapted from the Greek pantheon; but in administration and law they were unexampled innovators and in these fields they influenced subsequent European civilization mightily. See:

(a) For the Religion:

Roman Religion  
Jupiter  
Janus  
Mars

Quirinus

Vesta

Auguries and Auspices

Flamens

Lupercalia

Salii

(b) For the Language and Culture:

Italic Languages

Latin Language

Latin Literature

Roman Art

Philosophy

(c) For Administration and Law:

Civil Law

Justinian

Twelve Tables

Jus Gentium

Municipality

Papinianus

Paulus

Pandects

(d) For the Historians:

Ammianus Marcellinus

Annals

Appianus

Eutropius

Ferrero, G.

Gibbon, E.

Ihne, W.

Livy

Merivale, C.

Mommsen, T.

Niebuhr, B. G.

Sallust

Suetonius

Tacitus

## B. Mediæval History

1. The East Roman or Byzantine Empire continued to exist for a thousand years. Within the limits of the Western Empire the Germanic tribes settled as masters, and from their gradual amalgamation with the conquered Roman provincials date the beginnings of the modern peoples of Europe. The most powerful of the barbarian kingdoms, that of the Franks, attained imperial extension under Charles the Great, who, by his alliance with the Pope, established the connection between Empire and Church, which was to become one of the most powerful determinants of events in the Middle Ages. See:

(a) For the Migrations:

Migration

Britannia

Angles

Saxons

Jutes

Gaul

Burgundians

Franks

Hispania

Suevi

Vandals

Italy

Goths

Theodoric

Lombards

Saracens

(b) For the East Roman Empire:

Byzantine Empire

Justinian

Belisarius

Narses

## (c) For the Frankish Empire:

Clovis  
 Merovingians  
 Carolingians  
 Brunhilda  
 Fredegunda  
 Charles Martel  
 Pepin the Short  
 Donation of Pepin  
 Charles the Great  
 Papal States  
 Salic Law

2. On the death of Charles the Great the Frankish Empire falls apart. Two great kingdoms arise, France and Germany. The Germans make their power supreme in Central Europe and in Italy, and a German king is crowned Holy Roman Emperor, reviving the connection between Church and State established by Charles the Great. A second Teuton stock, the Northmen, appear as conquerors in France, England, Italy, and Russia. The growth of nations proceeds rapidly, and from the relations between conqueror and conquered develops Feudalism. The young nations are brought into conflict with the growing power of the Church, which, under the leadership of the Bishop of Rome, seeks to raise the ecclesiastical power above the secular. The break-up of the Mediæval ages begins with the Crusades. See:

## (a) For the Growth of Nations:

Franks  
 Verdun, Treaty of  
 France  
 Neustria  
 Germany  
 Austrasia  
 Franconia  
 Swabia

Alemanni  
 Otho the Great  
 Holy Roman Empire  
 Normans  
 Normandy  
 Varangians  
 England  
 William the Conqueror  
 Italy  
 Sicily  
 Guiscard  
 Russia

## (b) For Mediæval Society:

Feudalism  
 Feud  
 Livery  
 Homage  
 Knight  
 Chivalry  
 Esquire  
 Heraldry  
 Serf  
 Ordeal  
 Truce of God  
 Compurgation

## (c) For the Struggle between Church and State:

Gregory VII  
 Investiture  
 Hohenstaufen  
 Guelphs and Ghibellines  
 Henry IV of Germany  
 Henry V of Germany  
 Papacy  
 Innocent III  
 Philip II of France  
 Philip IV of France  
 John of England  
 Henry II of England  
 Frederick I Barbarossa  
 Frederick II of Germany

## (d) For the Crusades:

Crusades

Papacy  
 Hospitalers  
 Templars  
 Teutonic Knights  
 Peter the Hermit  
 Urban II  
 Godfrey de Bouillon  
 Bohemund  
 Tancred  
 Baldwin  
 Antioch  
 Richard I of England  
 Saladin  
 Venice  
 Dandolo  
 Louis IX of France  
 Latin Kingdom of Jerusalem

3. The Crusades were followed by a great increase in the commerce of Western Europe and the rise of an influential burgher class, with whose aid the kings succeeded in making themselves independent of the feudal nobility. With the growth of centralized kingdoms the power of the Papacy declines. Contact with the East and the ancient world stimulated the European mind, and the Revival of Learning, the succession of great geographical and astronomical discoveries, and the invention of gunpowder and printing hasten the transition from the Middle Ages to modern times. The uniformity of European society, characteristic of the Middle Ages, is broken up by the Reformation. See:

(a) For Commerce, Discoveries, and Inventions:

Hanseatic League  
 Gunpowder  
 Printing  
 Copernicus  
 Columbus

Gama, Vasco da  
 Venice  
 Genoa  
 Henry the Navigator  
 Africa  
 America

(b) For the Decline of the Papacy:

Boniface VIII  
 Avignon  
 Schism, Great  
 Constance, Council of  
 Basel, Council of

(c) For the Revival of Learning and the Renaissance:

Petrarch  
 Bracciolini  
 Guarino  
 Poliziano  
 Lorenzo de' Medici  
 Erasmus  
 Colet  
 Grocyn  
 Linacre  
 More, Thomas  
 Reuchlin  
 Hutten, Ulrich von  
 Epistolæ Obscurorum Virorum  
 Renaissance Art

(d) For the Reformation:

Reformation  
 Wiclif  
 Huss  
 Luther  
 Charles V  
 Augsburg Confession  
 Melancthon  
 Schmalkaldic League  
 Zwingli  
 Calvin  
 Huguenots  
 Henry VIII of England  
 Wishart  
 Knox

Counter-Reformation  
Trent, Council of  
Thirty Years' War

For the Historians:

Creighton, M.  
Denifle, F. H.  
Emerton, E.  
Fisher, G. P.

Fleury, Claude  
Gieseler, J. K.  
Hallam, H.  
Harnack, Adolf  
Hefele, K. J.  
Lea, H. C.  
Neander, J. A.  
Pastor, L.

## C. Modern History

At the opening of the modern era the process of State formation in Europe had resulted in the establishment of firmly centralized nations in England, France, and Spain. Germany and Italy, on the contrary, were disunited, and destined so to remain till the later years of the nineteenth century. The conflicts of States and nationalities is one of the great features of modern times; till 1648 religion is a fruitful cause of external warfare and civil strife; after 1648 wars are fought on political and commercial grounds. The disappearance of a common Church and of Latin as the common vehicle of communication among the higher classes tended to intensify the differentiation of national characteristics. The burgher class, which had begun to assert itself in the period after the Crusades, rose to full recognition in the life of the State and in turn was forced to render recognition, after the French Revolution, to the lowest classes in the State, artisans and peasants. The Church loses control over the temporal affairs of its members, and even in the spiritual field its authority is subordinated to that of the State. Life takes on a predominantly secular tinge; science broadens the intellectual horizon,

and commerce and colonization bring the non-European part of the Eastern Hemisphere within the sphere of European influence. The history of modern times is best studied in the history of the various nations.

### 1. ENGLAND.

The Britannia of the Romans is overrun in the age of migrations by Teutonic tribes from Jutland and the northwest of Germany, who, receiving a new infusion of kindred blood from the Danes, are conquered in the eleventh century by a more remote kinsfolk, the Normans—Gallicized Teutons from France. Saxons and Normans are blended into one before 1400, by which time a constitutional system of government, worked out in the course of long conflicts between rulers and subjects, is in force, based on the supreme legislative authority of a Parliament, representing the different estates. Wales and Ireland have been subdued, and Scotland has ceased to be a dangerous rival. Feudalism, never so strong in England as on the Continent, is practically destroyed during the Wars of the Roses in the fifteenth century, and the modern era may be dated from the accession of the Tudors in 1485. See:

England  
 Britannia  
 Anglo-Saxons  
 Heptarchy  
 Alfred  
 Edward the Confessor  
 Canute  
 Harold  
 Witenagemot  
 William the Conqueror  
 Hastings, Battle of  
 Hereward  
 Domesday Book  
 William II  
 Henry I  
 Stephen  
 Plantagenet  
 Henry II  
 Becket  
 Ireland  
 English Pale  
 Richard I  
 John  
 Magna Charta  
 Oxford, Provisions of  
 Montfort, Simon de  
 Edward I  
 Parliament  
 Wales  
 Llewellyn ap Griffith  
 Scotland  
 Wallace  
 Bruce  
 Bannockburn  
 Edward II  
 Mortimer, Roger de  
 Edward III  
 Hundred Years' War  
 Crécy  
 Poitiers  
 Black Death  
 Richard II  
 Tyler's Rebellion  
 Ball, John

Wiclif  
 Provisors, Statute of  
 Præmunire  
 Mortmain, Statutes of  
 Lancaster, House of  
 Henry IV  
 Agincourt  
 Henry VI  
 York, House of  
 Margaret of Anjou  
 Cade, Jack  
 Roses, Wars of the  
 Edward IV  
 Warwick, Earl of  
 Richard III  
 Tudor

Under the Tudors the power of Parliament greatly declined. The Reformation, initiated by Henry VIII, soon spread beyond the limits the King would set to it, and England became Protestant. Under Elizabeth it was forced to contend against Spain, the champion of Catholicism. With the defeat of Spain, England enters on her career as ruler of the seas and begins the work of founding a new English-speaking nation across the Atlantic. The death of Elizabeth, the last of the Tudors, gives England and Scotland a common sovereign. A revived Parliament asserts its rights successfully against the absolutism of the Stuarts, dethrones them, recalls them, and drives them as enemies of Protestantism once more from the throne, bestowing the crown upon a prince of Dutch blood. The crowns of England and Scotland are united. On the Continent, England takes a leading part in the overthrow of Louis XIV of France and comes out of the struggle more powerful than ever upon the seas. See:

Henry VII

Parliament  
 Star Chamber  
 Benevolence  
 Henry VIII  
 Boleyn, Anne  
 Wolsey, Cardinal  
 Cromwell, Thomas  
 Reformation  
 Cranmer  
 Edward VI  
 Mary I  
 Ridley  
 Latimer  
 Elizabeth  
 Supremacy  
 Mary Stuart  
 Burleigh  
 Walsingham  
 Leicester  
 Essex  
 Armada  
 Drake  
 Howard  
 Stuart  
 James I  
 Charles I  
 Petition of Rights  
 Ship-Money  
 Strafford, Earl of  
 Laud  
 Long Parliament  
 Grand Remonstrance  
 Five Members  
 Pym  
 Eliot  
 Hampden  
 Cromwell, Oliver  
 Vane, Henry  
 Blake  
 Fairfax  
 Ireton  
 Scotland  
 Covenants  
 Presbyterianism

Montrose, Earl of  
 Charles II  
 Clarendon, Earl of  
 Cabal  
 Test Acts  
 Oates, Titus  
 Shaftesbury, Earl of  
 James II  
 Halifax, Earl of  
 William III  
 Mary II  
 Anne  
 Succession Wars (*Spanish*)  
 Utrecht, Treaty of  
 Marlborough, Duke of  
 Bolingbroke  
 Harley  
 Sacheverell

With the accession of the House of Hanover, the supremacy of Parliament is firmly established; cabinet government is developed, and the rule of party is the order—by the Whigs, roughly speaking, to the French Revolution, by the Tories to 1832, by the two or their successors since then, in comparatively rapid alternation. France is defeated and deprived of her Indian and American possessions, but almost immediately England suffers an irreparable loss in the defection of the thirteen colonies. Partial compensation, however, is found in India, where English adventurers build up a new empire. After the French Revolution and the Napoleonic Wars, comes strife between the advocates of reaction and the rising forces of democracy, stimulated by the great industrial revolution. The latter win in 1832, and the subsequent history of England is one of democratic progress within, of conquest and commercial expansion abroad. See:

United Kingdom  
 Whig and Tory  
 George IV  
 Cabinet  
 South Sea Company  
 Walpole, Robert  
 Newcastle, Duke of  
 Chatham, Earl of  
 Seven Years' War  
 Bute, Earl of  
 Grenville  
 Townshend  
 Wilkes, John  
 North, Lord  
 Fox, Charles James  
 Pitt, William  
 Burke, Edmund  
 Sheridan, R. B.  
 Trafalgar  
 Nelson  
 Wellington  
 Peninsular War  
 Canning  
 India  
 Clive  
 Hastings, Warren  
 Wellesley, Marquis  
 Cornwallis, Lord  
 Dupleix  
 William IV  
 Peterloo Massacre  
 Trade Unions  
 Russel, Lord John  
 Grey, Earl (1st, 2d and 3d)  
 Victoria  
 Corn Laws  
 Peel, Robert  
 Cobden, John  
 Bright, John  
 Palmerston, Lord  
 Derby, Earl  
 Disraeli  
 Gladstone  
 Salisbury, Marquis of

Rosebery, Earl of  
 Chamberlain, Joseph  
 Balfour, Arthur  
 Beresford, Lord C.  
 Campbell-Bannerman  
 Law, A. Bonar  
 Morley, Viscount  
 Ireland  
 Tyrconnel  
 Stewart, Robert  
 Home Rule  
 Roman Catholic Emancipation  
 O'Connell, Daniel  
 Irish Land Laws  
 Fenian Society  
 Redmond, J. E.  
 Parnell, Charles Stewart  
 Australia  
 Canada  
 Imperial Federation  
 Edward VII  
 South African War  
 French, Sir J. W.  
 Union of South Africa  
 War in Europe  
 Asquith, H. H.  
 Lloyd-George, D.  
 Kitchener of Khartum  
 George V  
 Churchill, W. S.  
 Curzon, Earl

## For the Historians:

Acton, J. E. E. D.  
 Bury, J. B.  
 Clarendon, Lord  
 Elphinstone, M.  
 Firth, C. H.  
 Freeman, E. A.  
 Froude, J. A.  
 Fyffe, C. A.  
 Gairdner, J.  
 Gardiner, S. R.  
 Geoffrey of Monmouth



Gildas  
 Giraldus de Barri  
 Green, J. R.  
 Gross, C.  
 Gwatkin, H. M.  
 Hallam, H.  
 Holinshed, R.  
 Kinglake, A. W.  
 Kingsford, W.  
 Lappenberg, J. M.  
 Lecky, W. E. H.  
 Lingard, J.  
 Macaulay, T. B.  
 McCarthy, Justin  
 Maitland, F. W.  
 Napier, W. F. P.  
 Oman, C. W. C.  
 Palgrave, F.  
 Paris, Matthew  
 Rose, J. H.  
 Seebohm, F.  
 Stubbs, W.  
 Turner, Sharon  
 Walpole, Spencer  
 William of Malmesbury

## 2. FRANCE.

Upon the dissolution of the Frankish Empire in the ninth century, descendants of Charles the Great continue to rule over the land of the Western Franks with a population predominantly Celtic and a language derived from the Latin. This is the beginning of France. The weak Carolingians are replaced by the energetic house of Capet, under which the unification of the country is carried on by such able rulers as Philip II, Louis IX, and Philip IV. The Hundred Years' War is disastrous to the kingdom, but its recovery is rapid under Charles VII and his son, Louis XI, who leave the

power of the crown firmly established. Religious wars in the sixteenth century become a factor for anarchy, but feudalism is definitely crushed by Richelieu, and absolutism is established by Louis XIV, under whom France is for fifty years the overweening power in Europe. Absolutism breaks down under Louis XIV's unworthy successors, and the entire ancient fabric of society is swept away by the French Revolution. See:

France  
 Brittany  
 Normandy  
 Burgundy  
 Flanders  
 Aquitania  
 Anjou  
 Navarre  
 Franks  
 Carolingians  
 Verdun, Treaty of  
 Capetian Dynasty  
 Louis VII  
 Philip II, Augustus  
 Louis IX  
 Philip IV, the Fair  
 Valois, House of  
 Hundred Years' War  
 Crécy  
 Poitiers  
 John II  
 Jacquerie  
 Charles VI  
 Agincourt  
 Du Guesclin  
 Dunois  
 Joan of Arc  
 Charles VII  
 Louis XI  
 Charles the Bold  
 Charles VIII

Louis XII  
 Francis I  
 Henry II  
 Huguenots  
 Catharine de' Medici  
 Guise  
 Condé  
 Coligny  
 Bartholomew's, Massacre of Saint  
 Charles IX  
 Henry III  
 Politiques  
 Henry IV  
 Nantes, Edict of  
 Sully, Duke de  
 Louis XIII  
 Richelieu  
 Westphalia, Peace of  
 Mazarin  
 Maintenon, Marquise de  
 Louis XIV  
 Fronde  
 Parlement  
 Colbert  
 Louvois  
 Turenne  
 Vendôme, Duke de  
 Luxembourg, Duke of  
 Villars  
 Camisards  
 Succession Wars  
 Orleans, Philippe, Duke of  
 Dubois  
 Louis XV  
 Seven Years' War  
 Pompadour, Marquise de  
 Du Barry, Countess  
 Louis XVI  
 Turgot  
 Necker  
 Farmers-General  
 States-General  
 The abolition of feudalism by the  
 French National Assembly is followed

by the overthrow of the monarchy.  
 Assailed by the rulers of Europe,  
 France retaliates, and its conquering  
 armies carry the gospel of democracy  
 over the Continent. Under Napoleon,  
 France dominates Europe until, de-  
 feated by a rising of the European  
 peoples, it is compelled to take back its  
 Bourbon kings. Reaction struggles  
 with the advancing ideals of political  
 and social revolution, and the country  
 witnesses within the century the over-  
 throw of three dynasties and the estab-  
 lishment of two republics. Under  
 Napoleon III, France regains for a  
 brief period its ascendancy in Euro-  
 pean politics, but suffers overwhelming  
 defeat at the hands of a new-created  
 Germany. Her latest history has to  
 do with the slow grounding of repub-  
 lican principles, the adjustment of rela-  
 tions between Church and State and the  
 great war which began in 1914. See:

French Revolution  
 Assembly, National  
 Mirabeau  
 Marie Antoinette  
 Bastille  
 National Guard  
 Lafayette  
 Bailly  
 Jacobins  
 Feuillants  
 Cordeliers  
 Barnave  
 Pétion  
 Pillnitz  
 Valmy  
 Jemappes  
 Dumouriez  
 Convention, National  
 Girondists  
 Brissot

Roland de la Platière

Vergniaud

Montagnardes

Marat

Danton

Billaud-Varennes

Carnot

Callot d'Herbois

Robespierre

Saint-Just

Vendée

Hébert

Jourdan

Pichegru

Morreau

Barras

Directory

Sieyès

Talleyrand

Josephine

Napoleon I; III

Masséna

Ney

Murat

Davout

Junot

Marmont

Lannes

Soult

Suchet

Victor

Beauharnais

Continental System

Code Napoléon

Separation of Church and State

Louis XVIII

Charles X

Louis Philippe

Guizot

Thiers

Ledru-Rollin

Blanc, Louis

Eugénie-Marie de Montijo

Crimean War

Franco-German War

Bazaine

Favre, Jules

Gambetta

MacMahon

Ferry

Boulanger

Casimir-Périer

Faure

Loubet

Dreyfus, Alfred

Waldeck-Rousseau

Delcassé

Triple Entente

Freycinet

Ribot

Fallières

Jaurès

Poincaré

Viviani

Briand

Gallieni

Joffre

War in Europe

For the Historians:

Chéruel, P. A.

Duruy, V.

Froissart, J.

Guizot, F. P. G.

Hanotaux, G.

Houssaye, H.

Joinville, Jean

Lanfrey, P.

Lavissee, E.

Luchaire, A.

Martin, H.

Michaud, J.

Michelet, J.

Mignet, F. A. M.

Montalembert, C. F.

Rambaud, A. N.

Seignobos, C.

Sorel, A.  
 Stephens, H. M.  
 Sybel, H.  
 Thierry, Amédée  
 Thierry, Augustin  
 Thou, J. A. de  
 Villehardouin, Geoffroy de

### 3. GERMANY.

German history, like the history of France, may be dated from the dissolution of the Frankish Empire. Unlike France, Germany knew no unity until the very latest times. The establishment of the Holy Roman Empire in the tenth century connected the political fortunes of Germany with those of Italy and the Papacy, and the history of the empire is but the history of the separate states within the empire. After 1273, the imperial dignity is held, as a rule, by members of the house of Hapsburg, and the imperial interests become more and more Austrian. Disunion is fostered by the Reformation and perpetuated by the 'Thirty Years' War. In the eighteenth century, Prussia enters into competition with Austria for leadership in the empire, which, after existing for more than eight hundred years, is dissolved by Napoleon in 1805. The quarrel between Prussia and Austria is fought out in the nineteenth century, and the former triumphs. A new German Empire is formed, differing from the Holy Roman Empire in its national character, and, as the strongest military power on the Continent, occupies a leading place in the European system. See:

Germany  
 Prussia  
 Bavaria

Saxony  
 Württemberg  
 Hanover  
 Baden  
 Verdun, Treaty of  
 Franconia  
 Swabia  
 Lorraine  
 Otho I  
 Holy Roman Empire  
 Henry II, IV, VI  
 Conrad II  
 Investiture  
 Gregory VII  
 Hohenstaufen  
 Guelphs and Ghibellines  
 Frederick I, Barbarossa  
 Frederick II  
 Hapsburg  
 Rudolph I  
 Austria-Hungary  
 Charles IV, V, VI  
 Golden Bull  
 Electors  
 Sigismund  
 Maximilian I  
 Aulic Council  
 Reformation  
 Passau, Treaty of  
 Bohemia  
 Thirty Years' War  
 Leopold I  
 Pragmatic Sanction  
 Frederick William I, III, IV  
 Frederick II  
 Maria Theresa  
 Succession Wars (*Austrian*)  
 Seven Years' War  
 Francis II of Austria  
 Stein  
 Scharnhorst  
 Blücher  
 Gneisenau  
 Leipzig, Battles of

Waterloo  
 Vienna, Congress of  
 Metternich  
 Burschenschaft  
 Zollverein  
 Frankfort, Council of  
 Seven Weeks' War  
 Bismarck-Schönhausen  
 Moltke  
 William I  
 Kulturkampf  
 Triple Alliance  
 William II  
 Caprivi  
 Hohenlohe  
 Bülow  
 Bethmann-Hollweg  
 Jagow  
 Hindenburg  
 Tirpitz  
 War in Europe

For the Historians:

Bulle, K.  
 Dahlmann, F. C.  
 Dahn, F.  
 Droysen, J. G.  
 Dümmler, E.  
 Erdmannsdörffer, B.  
 Gfrörer, A. F.  
 Giesebrecht, F. W. B.  
 Häusser, L.  
 Janssen, J.  
 Lamprecht, K.  
 Marcks, E.  
 Maurenbrecher, W.  
 Müller, Johannes  
 Oncken, W.  
 Ranke, L.  
 Raumer, F. L.  
 Sybel, H.  
 Treitschke, H.  
 Waitz, G.

4. AUSTRIA-HUNGARY.

Austria-Hungary is a political unit merely and in no sense a national State, and its history is largely that of the several states that compose it. The relationship to European affairs resulting from the close connection between the house of Austria and the Holy Roman Empire, for five centuries, is best traced under GERMANY, which see. Here, the internal affairs alone will be touched upon, and the history may be summed up in the history of a family, the Hapsburgs, that, starting with small territorial possessions in the Swabian mountains, brought under its sway by conquest or marriage the heart of Central Europe, from the Carpathians to the Alps and from the Vistula to the Danube and the Adriatic Sea. See:

(a) For Austria:

Austria-Hungary  
 Bohemia  
 Dalmatia  
 Styria  
 Moravia  
 Galicia  
 Tyrol  
 Carinthia  
 Carniola  
 Babenberg  
 Ottokar II  
 Hapsburg  
 Rudolph I  
 Albert II  
 Maximilian I  
 Charles V  
 Ferdinand I, II  
 Maximilian II  
 Thirty Years' War  
 Succession Wars (*Spanish*)  
 Eugène, Prince  
 Joseph II

Leopold II  
 Campo-Formio  
 Lunéville  
 Pressburg  
 Vienna, Congress of  
 Metternich  
 Francis II  
 Francis Joseph I  
 Windischgrätz  
 Radetzky  
 Lombardy  
 Seven Weeks' War  
 Ausgleich  
 Triple Alliance  
 War in Europe

(b) For Hungary:

Hungary  
 Arpad  
 Báthory  
 Louis I, II  
 Sigismund  
 Hunyady, János  
 Matthias Corvinus  
 Mohács  
 Zápolya  
 Tökölyi  
 John III, Sobieski  
 Rákóczy  
 Deák, Ferencz  
 Batthyányi  
 Kossuth  
 Bem  
 Dembinski  
 Görgey  
 Mészáros  
 Klapka  
 Haynau  
 Tisza

(b) For the Historians:

Arneth, A. R.  
 Fessler, I. A.  
 Gindely, A.  
 Hormayr, J.

Krones, F.  
 Mailáth, J.  
 Zeissberg, H.  
 Wolf, Adam

5. THE IBERIAN PENINSULA.

One of the richest regions of the Roman Empire, Hispania, was wrested from the Romans by successive waves of barbarian invaders in the fifth century of our era. The Christian Gothic kingdom was overthrown by the Arabs, who developed in the peninsula a civilization that was long the highest in Europe. The remnants of the Christian inhabitants rallied in the northern mountains and a slow but steady process of reconquest was begun, hastened by the dissolution of the Arab Caliphate, retarded by strife among the various Christian kingdoms, completed before the end of the fifteenth century, when the greater part of the peninsula had been brought under one crown. Portugal alone preserved its independence of Castile. Enriched by the wealth of a newly discovered world and her Lowland possessions, Spain, in the sixteenth century, plays the leading rôle in European affairs and then enters on a course of political and economic decline which has continued to the present day. Portugal and Great Britain have been friends since the beginning of the eighteenth century. See:

(a) For Spain:

Spain  
 Iberians  
 Phœnicia  
 Carthage  
 Hispania  
 Lusitania

Goths  
 Suevi  
 Roderick  
 Moors  
 Tarik  
 Omniads  
 Cordova  
 Mohammedan Art  
 Navarre  
 Asturias  
 León  
 Castile  
 Aragon  
 Almoravides  
 Almohades  
 Granada  
 Boabdil  
 Ferdinand V of Castile  
 Isabella I, II  
 Ximenes  
 Inquisition  
 Cortes  
 Fuero  
 Padilla, Juan  
 Alcántara  
 Calatrava  
 Gonsalvo de Cordova  
 Philip II, III, IV  
 Armada  
 Charles, II, IV  
 Succession Wars (*Spanish*)  
 Alberoni  
 Farnese  
 Godoy  
 Peninsular War  
 Ferdinand VII  
 Carlos, Don  
 Maria Christina  
 Espartero  
 Narváez  
 Prim  
 O'Donnell  
 Castelar  
 Serrano

Amadeus I  
 Alfonso XII, XIII  
 Cánovas del Castillo  
 Sagasta  
 Silvela  
 Spanish-American War

(b) For Portugal:

Portugal  
 Alfonso I, V  
 Diniz  
 John I, III  
 Henry the Navigator  
 Manuel the Great  
 Gama, Vasco da  
 Almeida  
 Albuquerque  
 Braganza, House of  
 Methuen Treaty  
 Pombal  
 Peninsular War  
 Miguel, Dom  
 Pedro, Dom  
 Saldanha  
 Charles I  
 Brazil  
 Manuel I, II  
 War in Europe

(c) For the Historians, see:

Barros, J. de  
 Coxe, W.  
 Dozy, R.  
 Gayangos  
 Lafuente, M.  
 Lea, H. C.  
 Llorente, J. A.  
 Mariana, J.  
 Prescott, W. H.  
 Robertson, W.  
 Zurita Y. Castro

6. ITALY.

The fall of the Western Empire was followed by a struggle between the

Goths and the Byzantines for the possession of Italy. The latter held the south while the north passed from the Goths to the Lombards and the Franks. Constituted with Germany into a shadowy Holy Roman Empire, Italy enters upon a period of utter disunion with the Papal power established in the centre of the peninsula, the north parceled out into independent principalities and republics, the south ruled by Normans, Saracens, French, and Spaniards. The Italian cities rise to great prosperity after the Crusades and become the cradle of the Renaissance. The state of political disintegration continues till the later part of the nineteenth century and Italy suffers from internal strife and foreign domination, Spain and Austria playing the master in the greater part of the peninsula. Union comes to the country from the house of Savoy, whose power, spreading over Sardinia and Piedmont, after a contest with Austria, the Papacy, and Spain, spreads over the entire peninsula. Early Italian history is best studied in the story of separate states and celebrated families. See:

Rome  
 Venice  
 Florence  
 Milan  
 Genoa  
 Pisa  
 Lucca  
 Verona  
 Bologna  
 Ravenna  
 Ferrara  
 Naples  
 Papal States  
 Two Sicilies, Kingdom of  
 Sicily

Foscari  
 Falieri  
 Malatesta  
 Medici  
 Visconti  
 Colonna  
 Orsini  
 Este  
 Borgia  
 Theodoric the Great  
 Belisarius  
 Narses  
 Lombards  
 Saracens  
 Normans  
 Guiscard  
 Crusade  
 Renaissance  
 Charles VIII of France  
 Sforza  
 Condottieri  
 Louis XII of France  
 Ferdinand V of Spain  
 Julius II (Pope)  
 Savoy  
 Napoleon I  
 Suvaroff  
 Nelson  
 Murat  
 Carbonari  
 Holy Alliance  
 Victor Emmanuel I, II, III  
 Charles Albert  
 Mazzini  
 Young Italy  
 Radetzky  
 Manin  
 Cavour  
 Garibaldi  
 Villafranca  
 Rattazzi  
 Ricasoli  
 Crispi  
 Rudini



Depretis  
Humbert I  
Mafia  
Turco-Italian War  
Salandra  
Sonnino  
War in Europe

For the Historians:

Amari, M.  
Balbo, C.  
Botta, C. G.  
Burckhardt, J.  
Cantù, C.  
Cibrario, G. A.  
Farini, L. C.  
Gallenga, A.  
Gregorovius, F.  
Hodgkin, T.  
Johnston, R. M.  
La Farina, G.  
Liudprand  
Muratori, L. A.  
Paulus Diaconus  
Sismondi, J. C.  
Symonds, J. A.  
Villari, P.

7. THE SLAV EMPIRE.

The Slav inhabitants of the plains south of the Finnish lakes received in the ninth century a ruler of Scandinavian stock, whose successors extended their sway to the southern rivers. The Byzantine civilization and religion are introduced. The unity of the country disappears after the tenth century, and its independence is swept away in the thirteenth by Mongol invaders from the east. The power of the Mongols breaks up in the fifteenth century and a new empire is created by the grand princes of Moscow, whose rule is steadily extended to the south and west at the expense of Poland and the Baltic

powers. Peter I brings Russia within the sphere of European politics and gains for his country a predominant place among the northern powers. With the Baltic reached, Russia turns once more to the south and driving the Turks before her, she reaches the Black Sea and seeks to press into the Balkan peninsula. The jealousy of the powers halts her progress and her advance assumes a new direction—eastward and southward in Asia, where the beginnings of her power had been made in the sixteenth century. In her attack on the integrity of the Chinese Empire, she finds a formidable rival in Japan. Internally, after Peter's time, a struggle goes on between the Eastern and Western civilization, which, at the beginning of the twentieth century, finds Russia still a despotism. Poland, at one time the greatest power in central Europe, fell through disunion and its territory was absorbed by Austria, Prussia, and, to the largest extent, by Russia. See:

(a) For Russia:

Russia  
Slavs  
Varangians  
Rurik  
Novgorod  
Kiev  
Vladimir  
Tchernigov  
Batu Khan  
Alexander Nevski  
Moscow  
Kiptchak  
Ivan III, the Great  
Ivan IV, the Terrible  
Godunoff, Boris  
Demetrius

Romanoff, House of  
 Peter I, the Great  
 Streltsi  
 Charles XII of Sweden  
 Anna Ivanovna  
 Dolgoruki  
 Golitzin  
 Biron  
 Anna Karlovna  
 Elizabeth Petrovna  
 Catharine II  
 Poland  
 Armed Neutrality  
 Paul I  
 Alexander I  
 Tilsit  
 Holy Alliance  
 Nicholas I  
 Crimean War  
 Alexander II  
 Serf  
 Nihilism  
 Russo-Turkish War  
 Berlin, Congress of  
 Loris-Melikoff  
 Alexander III  
 Ignatieff  
 Anti-Semitism  
 Nicholas II  
 Finland  
 Siberia  
 Manchuria  
 Russo-Japanese War  
 Goremykin  
 Nicholas (Nikolai Nikolaievitch)  
 War in Europe

(b) For Poland:

Poland  
 Lithuania  
 Teutonic Knights  
 Casimir III, the Great  
 Jagellons  
 Casimir IV

Sigismund the Great  
 Ukraine  
 Cossacks  
 Chmielnicki  
 Thorn  
 John III, Sobieski  
 Succession Wars (*Polish*)  
 Stanislas Leszczynski  
 Augustus II  
 Catharine II  
 Kosciuszko  
 Chlopicki  
 Bem  
 Dembinski  
 Panslavism  
 Aksakoff, I. S.  
 War in Europe

For the Historians:

- (a) Bestuzheff-Ryumin, K. N.  
 Brückner, A.  
 Karamzin, N. M.  
 Kostomaroff, N. I.  
 Pogodin, M. P.  
 Rambaud, A. N.  
 Solovieff
- (b) Chodzko, L. J.  
 Lelewel, J.  
 Niemcewicz, J. U.

8. THE BALKAN PENINSULA.

The Byzantine Empire, successor to the Roman Empire in the eastern Mediterranean, after a thousand years' existence, fell before the Turks, whose power, spreading northward beyond the Danube, extended over Hungary and threatened the Austrian dominions. The rapid decline of the Turks begins with the eighteenth century and has continued to the present day, resulting in the restriction of the Ottoman power to but a fraction of its once vast territories. Russia and Austria have stead-

ily pressed the Turkish power backward, and only the jealousy of the Western powers, England primarily, has preserved the integrity of the Empire. Part of the territory wrested from Turkey has been erected into independent Christian States. In 1908 the Young Turk movement overthrew the old order of things and established a constitutional government. In the Great War Turkey divorced herself from England and cast in her lot with the Teutonic allies. See:

(a) Turkey

Eastern Question  
Othman  
Amurath I  
Janizaries  
Bajazet I  
Amurath II  
Mohammed I  
Mohammed II  
Mohammed III  
Mohammed IV  
Mohammed V  
Selim I  
Solyman  
Lepanto  
Kiuprili  
Kara Mustapha  
Eugène, Prince  
Mahmud II  
Mehemet Ali  
Crimean War  
Abd ul-Aziz  
Abd ul-Hamid  
Russo-Turkish War  
Berlin, Congress of  
Greece  
Crete  
Armenia  
Albania  
Ali Pasha  
Macedonia

Adrianople  
Constantinople  
Abd ul-Medjid  
Turco-Italian War  
Balkan War  
War in Europe

(b) Greece

Hetæra  
Coray  
Ypsilanti  
Mavrocordatos  
Miaulis  
Kanaris  
Bozzaris  
Kolokotronis  
Capo d'Istria  
Navarino  
Otto I  
George I  
Trikoupis  
Delyannis  
Trikoupis, C.  
Constantine I  
Balkan War  
Venizelos  
Zaimis  
War in Europe

(c) Servia

Czerny George  
Obrenovitch  
Alexander Karageorgevitch  
Milan I  
Natalie  
Ristic  
Alexander I  
Peter I, Karageorgevitch  
Skupshtina  
Bosnia  
Herzegovina  
Berlin, Congress of  
Panslavism  
Balkan War  
Pashich

War in Europe  
Mijatovich

(d) Bulgaria

Bulgars  
Russo-Turkish War  
Alexander I  
Ferdinand I  
Stambuloff  
Berlin, Congress of  
Balkan War  
Panslavism  
War in Europe

(e) Rumania

Moldavia  
Wallachia  
Kantemir  
Hospodar  
Fanariots  
Ypsilanti  
Ghika  
Russo-Turkish War  
Jews  
Berlin, Congress of  
Bratianu  
Charles I  
Balkan War  
Panslavism  
Ferdinand (Rumania)  
War in Europe

(f) Bosnia

(g) Herzegovina . .

(h) Montenegro

Berlin, Congress of  
Danilo I  
Panslavism  
Balkan War  
Scutari  
Nicholas I  
War in Europe

(i) Albania

Balkan War  
Essad Toptani

William of Wied  
War in Europe

For the Historians:

Creasy, E. S. (Turkish)  
Hammer-Purgstall (Turkish)  
Lambros (Greek)  
Trikoupis, S. (Greek)  
Ranke, L. von. (Servian)  
Mijatovich, C. (Servian)  
Jirecek, K. (Bulgarian)  
Iorga, N. (Rumanian)

8. THE MINOR NATIONS OF EUROPE.

(a) Denmark

Margaret  
Christian VII  
Christian VIII  
Christian IX  
Christian X  
Schleswig-Holstein  
Frederick III  
Frederick V  
Frederick VI  
Frederick VII  
Frederick VIII  
Norway  
Oscar II  
War in Europe

(b) Sweden

Finland  
Eric  
Kalmar  
Sture  
Gustavus Vasa  
Charles IX  
Gustavus Adolphus  
Oxenstierna  
Christina  
Charles XII  
Gustavus I-V  
Caps and Hats  
Charles XIV, John

Oscar I, II  
 Adolphus Frederick  
 War in Europe

(c) Norway

Normans  
 Harald Haarfagr  
 Iceland  
 Haakon  
 Denmark  
 Christian II, IV, VII  
 Frederick I, II  
 Haakon VII  
 Olaf  
 War in Europe

(d) Netherlands

Burgundy  
 Granvella  
 Margaret of Parma  
 William the Silent  
 Egmont  
 Hoorne  
 Alva  
 Farnese, Alexander  
 Barneveldt  
 Maurice of Nassau  
 Dort, Synod of  
 De Witt  
 Stadtholder  
 William III  
 Louis XIV  
 Wilhelmina  
 War in Europe

(e) Belgium

Flanders  
 Brabant  
 Walloons  
 Netherlands  
 Ostend Company  
 Frère-Orban  
 Rogier  
 Leopold I, II  
 Albert I  
 Vandervelde

Liège  
 Namur  
 Ostend  
 War in Europe

(f) Switzerland

Helvetii  
 Alemannia  
 Burgundy  
 Hapsburg  
 Tell, William  
 Morgarten  
 Sempach  
 Winkelried  
 Morat  
 Zurich  
 Hofer, Andreas  
 Sonderbund  
 War in Europe

For the Historians:

Blok, P. J. (Dutch)  
 Fryxell, A. (Swedish)  
 Geijer, E. (Swedish)  
 Juste, T. (Belgian)  
 Merle D'Aubigné (Swiss)  
 Motley, J. L. (Dutch)  
 Munch, P. A. (Norwegian)  
 Nielson, Y. (Norwegian)  
 Steenstrup, J. C. H. R. (Danish)

10. SOUTH AMERICA AND MEXICO.

Beginning with Mexico in 1519, the great regions of Central and South America were rapidly brought under Spanish rule, Portugal, however, held sway in Brazil, and in Guiana small portions fell to other European nations. The harsh Spanish rule led to bitter but unsuccessful uprisings among the Indian tribes of Peru and Chile. The first quarter of the nineteenth century witnessed the successful revolt of the Spanish dependencies, aided in their struggle by the decidedly

friendly attitude of Great Britain and the United States, of whom the latter now assumes the rôle, largely, of protector over the newly established republics. A decided inaptitude for self-government is evinced by these, and chronic disorder checks national development. Chile, Argentina, and Mexico are, however, prominent exceptions. Brazil, after living tranquilly as an independent empire, enters upon the troubled career of republican politics towards the end of the nineteenth century. The influence of the United States in South America becomes an important factor with the completion of the work of building the Panama Canal. See:

Mexico  
 Mexican Archæology  
 Montezuma  
 Cortés  
 Mendoza, Antonio de  
 Hidalgo, Miguel  
 Morélos  
 Itúrbide  
 Guerrero, Vicente  
 Santa Anna  
 Mexican War  
 Comonfort  
 Juarez  
 Miramon  
 Almonte  
 Maximilian  
 Lerdo de Tejada  
 Diaz, Porfirio  
 Villa  
 Huerta  
 Madero  
 Zapata  
 Central America  
 Guatemala  
 Nicaragua  
 Zelaya

Honduras  
 Salvador  
 Costa Rica  
 Morazán  
 Carrera, Rafael  
 Walker, William  
 Peru  
 Huayna Capac  
 Pizarro, Francisco  
 Pizarro, Gonzalo  
 Almagro  
 San Martin, José de  
 Prado, M. I.  
 Bolivia  
 Chile  
 Araucania  
 Valdivia, Pedro de  
 Carrera, José Miguel de  
 O'Higgins, Bernardo  
 San Martin, José de  
 Balmaceda, José Manuel  
 Argentina  
 Rosas, Juan Manuel  
 Urquiza, Justo José  
 Mitre, Bartolomé  
 Sarmiento, Domingo F.  
 Uruguay  
 Gauchos  
 Artigas, Fernando José  
 Flores, Venancio  
 Paraguay  
 Guaraní  
 Francia, José Gaspar  
 Lopez, Francisco Solano  
 Colombia  
 Ecuador  
 Venezuela  
 Castro, C.  
 Miranda, F.  
 Bolivar, Simon  
 Paez, José Antonio  
 Brazil  
 Pedro I, II  
 Fonseca, Deodoro da

For the Historians and Investigators,  
see:

Ixtlilxochitl

Prescott

Bancroft, H. H.

Bandelier, A. F. A.

Charnay, C. J. D.

Squier, E. G.

Markham, C. R.

Vicuña-Mackenna, Benjamin

Dupleix

Clive

East India Company

Hastings, Warren

Cornwallis, Lord

Wellesley, Marquis of

Nana Sahib

For the Religions of India, see Chapter  
on RELIGION.

## 11. THE FAR EAST.

(1) INDIA. The history of India may be divided into three periods, that of the early Hindu domination, the period of Mohammedan rule, and the period of European supremacy. See:

### (a) For the Peoples:

India

Indian Peoples

Aryan

Dravidians

Tamils

Telugus

Kanarese

Malayalim

### (b) For the History:

India

Bimbisara

Sandrocottus

Ghaznivides

Timur

Baber

Akbar

Shah Jehan

Aurungzebe

Nadir Shah

Ahmed Shah

Gama, Vasco da

Albuquerque

Almeida

Pondicherry

Goa

(2) CHINA. China presents the spectacle of a nation which, having attained a high degree of civilization at a time when Europe was still barbarian, has been content to remain quiescent while the world has moved forward. In spite of its vast latent strength, it seems destined to become the prey of European ambitions, unless the example of its kindred nation, Japan, should lead it to recognize the civilization of the West, and to observe the preponderant rôle that should be its own in the Orient. See:

China

Fuh-hi

She Hwang-Ti

Han

Genghis Khan

Kublai Khan

Ta Ts'ing

K'ang-hi

Hung-siu-ts'uen

Gordon, Charles George

Li Hung Chang

Kwang-Sü

Far Eastern Question

Tze-hsi

• Yuan Shih-kai

For the Philosophy and Religions of  
China, see Chapter on RELIGION.

(3) JAPAN. Among the nations of the East, Japan stands forth as an amazing exception to Eastern immobility.

ity. The political balance in the Pacific has been quite upset by the appearance of this new power, which, in less than four decades, has passed from feudalism and Oriental seclusion to a constitutional government and the skilful utilization of the sciences and wisdom of the West. Japan's triumph over China in 1894-95 first marked strength; its magnificent struggle against Russian aggression in China and its participation in the Great War raised the possibility of a quite unexpected development in the relations between Europeans and Mongolians.

See:

Japan  
 Jimmu Tennō  
 Taira  
 Samurai  
 Minamoto  
 Fujiwara  
 Yoritomo  
 Ashikaga  
 Daimio  
 Nobunaga  
 Hideyoshi  
 Iyeyasū  
 Tokugawa  
 Iyemitsu  
 Perry, M. C.  
 Kéiki  
 Mutsuhito  
 Arisugawa  
 II Kamon no Kami  
 Itagaki, Taisūke  
 Ito, Hirobumi  
 Iwákura, Tomomi  
 Okubo, Toshinichi  
 Okuma, Shigenobu  
 Soyeshima Tanéomi  
 Yamagata Aritomo  
 Kato  
 Yoshihito  
 War in Europe

See also:

Nichiren  
 Arai Hakuseki (1657—)  
 Motoori Norinaya (1730—)  
 Hokusai (1760—)  
 Fukuzawa, Yukichi  
 Kido, Takayoshi

For the Authorities, see:

Abeel, D.  
 Beal, S.  
 Biot, E. C.  
 Griffis, W. E.  
 Hirth, F.  
 Julien, S. A.  
 Legge, J.  
 Morrison, R.

## 12. THE UNITED STATES.

Norse explorations in North America, about the year 1000, led to no result, and Europe, before the time of Columbus, had no knowledge of a world beyond the Atlantic. The discovery, in 1492, was followed by a period of exploration, in which Spanish, French, English, and Dutch participated. Settlement follows, and poverty and religious persecution in Great Britain stretches a chain of English speaking colonies along the eastern coast of what is now the United States. Swedes and Dutch give way in time, and with Spain restricted to Florida, England enters into a struggle for possession of the interior with France, whose rule has meanwhile been extended over the basins of the St. Lawrence, the Mississippi, and the Great Lakes. England triumphs, and brings under her authority the disputed territory east of the Mississippi. See:

(a) The Discoverers:

Ericson



Vinland  
 Madog  
 Columbus  
 Vespuccius  
 Cabot  
 Cortereal  
 Verrazano  
 Ponce de Leon  
 Ayllon  
 Narváez, P. de  
 Nuñez Cabeça  
 De Soto  
 Coronado  
 Drake  
 Frobisher  
 Gilbert, Sir Humphrey  
 Gosnold  
 Smith, John  
 Norumbega  
 Cartier  
 Champlain  
 Hudson  
 Nicollet  
 Joliet  
 Marquette  
 La Salle  
 Hennepin  
 Tonty  
 Lewis, Meriwether  
 Clark, William  
 Pike  
 Long, S. H.  
 Bonneville  
 Catlin  
 Whitney, J. D.  
 Hayden  
 Powell, J. W.

Yeardley  
 Berkeley  
 Bacon  
 Bradford, William  
 Standish  
 Endecott  
 Winthrop  
 Minuit, Peter  
 Kieft  
 Stuyvesant  
 Hooker, T.  
 Davenport, J.  
 Williams, Roger  
 Hutchinson, Anne  
 Baltimore, Barons of  
 Claiborne  
 Friends  
 Penn  
 Oglethorpe

(c) For the Struggle with the French:

King William's War  
 Queen Anne's War  
 King George's War  
 French and Indian War  
 Pepperrell, Sir William  
 Louisburg  
 Albany Convention  
 Braddock  
 Amherst  
 Abercromby  
 Loudoun  
 Wolfe, James  
 Montcalm  
 Pontiac  
 Paris, Treaties of

(b) The Settlers:

See under the names of the thirteen original colonies; also:

London Company  
 Plymouth Company  
 Jamestown

England's triumph over France is followed almost immediately by the irreparable loss of the thirteen colonies. The injustice of Parliamentary taxation stirs the colonists to resistance, and the memory of their triumph over the French lends them courage for the struggle. See:

**(a) The Pre-revolutionary Period:**

Navigation Laws  
 Assistance, Writ of  
 Otis, James  
 Stamp Act  
 Sons of Liberty  
 Boston Massacre  
 Boston Tea Party  
 Boston Port Bill  
 Quebec Act  
 Adams, Samuel  
 Hancock, John

Marion  
 Sumter  
 Pickens  
 Lee, Richard Henry  
 Jones, Paul  
 Wayne, Anthony  
 Clark, George Rogers  
 Lafayette  
 Rochambeau  
 Grasse, Count de  
 Steuben  
 Kalb, Baron de  
 Kosciuszko  
 Pulaski  
 Howe, Lord  
 Clinton  
 Burgoyne  
 Cornwallis  
 Tarleton  
 Jefferson  
 Franklin, B.  
 Livingston, R. R.  
 Deane, Silas  
 Sherman, Roger  
 Morris, Robert  
 Declaration of Independence

**(b) The Revolution: (1) The Battles:**

Lexington  
 Concord  
 Bunker Hill  
 Long Island  
 Trenton  
 Princeton  
 Brandywine  
 Germantown  
 Oriskany  
 Bennington  
 Saratoga  
 Monmouth  
 Camden  
 Cowpens  
 Guilford Court House  
 Eutaw Springs  
 Yorktown

**(2) The Men:**

Warren  
 Putnam  
 Washington  
 Montgomery  
 Arnold  
 Lee, Charles  
 Gates  
 Greene  
 Conway  
 Stark  
 Herkimer  
 Morgan

The thirteen colonies, having vindicated their independence in a protracted war, are impelled for the defence of their now won liberties, and the furtherance of their common welfare, to organize themselves into a federal republic with a written constitution, in nature essentially a compromise between the ideas of local liberty and efficiency of the central authority. The Liberator of the nation is also its first executive. His death is followed by a struggle between the two constitutional principles. The advocates of "strict construction" triumph, and, in the person of Thomas Jefferson, the Republican-Democratic Party assumes power to hold it uninterruptedly for forty years. The

boundaries of the Union are extended by the admission of new States, and the national territory is enormously increased by the acquisition of Louisiana and Florida. Party differences disappear, for a while, after a second war with Great Britain, but a new cause of dissension appears in the form of the slavery question, which replaces constitutional politics by sectional. See:

(a) The Formation of the Union:

Constitution of the United States  
Shays's Rebellion  
Hamilton  
Madison  
Jay  
Pinckney, C. C.  
Wilson, James  
Randolph, Edmund  
Paterson, William  
Henry, Patrick  
Northwest Territory

(b) The Era of Party Strife:

Federalists  
Anti-federalists  
Federalist, The  
Gallatin, A.  
Marshall, John  
Burr  
Genet  
Jay Treaty  
Whisky Rebellion  
X. Y. Z. Correspondence  
Alien and Sedition Laws  
Virginia and Kentucky Resolutions  
Louisiana Purchase  
Lewis and Clark Expedition  
Continental System  
Orders in Council  
Embargo  
Chesapeake, The

Constitution, The  
Erie, Battle of Lake  
Thames, Battle of the  
Chippewa  
Lundy's Lane  
New Orleans, Battle of  
Tippecanoe  
Hull, Isaac  
Hull, William  
Lawrence  
Perry  
Macdonough  
Hartford Convention  
Cushing, Caleb  
Ghent, Treaty of  
Missouri Compromise  
Monroe, James  
Monroe Doctrine

The Democratic Party in the course of time did not fail to adopt many of the principles of the old Federalists, among them notably the national encouragement of internal improvements and the creation of a Government bank. The tendency on the part of a faction to lay stress on these functions of the Government led to the dissolution of the Democratic Party. The Whigs now appear, historically the successors of the Federalists and the predecessors of the Republican Party. The hierarchic succession of presidents ends in 1828, and the Western Democracy triumphs in the person of Andrew Jackson. Sectional feeling, fostered by growing economic differences between North and South, is intensified by the rise in the North of an outspoken spirit of opposition to the institution of slavery. The two political parties for a time eagerly ignore the issue, and Southern statesmen, armed with the threat of a disruption of the Union, succeed in coercing the conservatives in the North.

Territorial expansion, however, forces the slavery question into the foreground; the Whig Party, unwilling directly to challenge the issue, is succeeded by the Republican Party, which will. The Democratic Party is broken in two. With the triumph of the anti-slavery party in 1860, the South secedes from the Union. See:

(a) The Formation of Parties and the Rise of the Slavery Question:

Democratic Party  
 Adams, John Quincy  
 Crawford, William  
 Jackson, Andrew  
 Caucus  
 Whig Party  
 Clay, Henry  
 Cumberland Road  
 Tariff  
 Nullification  
 McDuffie  
 Calhoun, John C.  
 Hayne, Robert  
 Webster  
 Abolitionists  
 Garrison, William Lloyd  
 Phillips, Wendell  
 Lovejoy, Elijah  
 Lundy, Benjamin  
 Van Buren  
 Marcy, W. L.  
 Harrison, William Henry  
 Tyler  
 Webster-Ashburton Treaty  
 Northeast Boundary Dispute  
 Polk  
 Texas  
 Houston, Samuel  
 Oregon  
 Northwest Boundary Dispute  
 Mexican War  
 Wilmot Proviso  
 Scott, Winfield

Taylor, Zachary  
 Fillmore  
 Cass  
 Clayton-Bulwer Treaty

(b) The Final Struggle over Slavery:

Free Soil Party  
 Compromise Measures of 1850  
 Fugitive Slave Law  
 Seward  
 Sumner  
 Davis, Jefferson  
 Underground Railroad  
 Pierce, Franklin  
 Kansas-Nebraska Bill  
 Popular Sovereignty  
 Thayer, Eli  
 Republican Party  
 Douglas, Stephen A.  
 Taney, Roger  
 Dred Scott Case  
 Buchanan, James  
 Brown, John  
 Lincoln, Abraham  
 Breckinridge, J. C.  
 Bell, John  
 Constitutional Union Party

(c) The Civil War:

Civil War in America  
 Confederate States of America  
 Stephens, Alexander  
 Benjamin, Judah P.  
 Toombs, Robert

1. The Battles:

I. In the East:

Fort Sumter  
 Big Bethel  
 Bull Run  
 Ball's Bluff  
 Williamsburg  
 Seven Pines  
 Mechanicsville

Gaines's Mill  
 Savage's Station  
 Frazier's Farm  
 Malvern Hill  
 Bull Run (second)  
 Antietam  
 Fredericksburg  
 Chancellorsville  
 Gettysburg

## II. In the West:

Wilson's Creek  
 Paducah  
 Belmont  
 Fort Henry and Fort Donelson  
 Pea Ridge  
 Shiloh  
 Corinth  
 Iuka  
 Island No. 10  
 New Orleans  
 Perryville  
 Stone River  
 Vicksburg  
 Chickamauga  
 Chattanooga  
 Mobile Bay

## III. The Final Campaigns:

Dalton  
 Kenesaw Mountain  
 Nashville  
 Fort McAllister  
 Bentonville  
 Wilderness  
 Spottsylvania Court House  
 Cold Harbor  
 Monocacy  
 Winchester  
 Cedar Creek  
 Five Forks  
 Petersburg  
 Appomatox Court House

## 2. The Men:

Grant  
 Sherman  
 Sheridan  
 McClellan  
 Meade  
 Thomas  
 Burnside  
 Halleck  
 Hooker  
 Rosecrans  
 Buell  
 Hancock  
 Pope  
 Lyon  
 Foote  
 Farragut  
 Lee  
 Jackson  
 Johnston  
 Johnston  
 Longstreet  
 Beauregard  
 Bragg  
 Hood  
 Early

## (d) Emancipation Declaration

### Draft Riots

Four years of civil war established the principle that the United States, once perhaps a federation, is now a nation. Slavery is abolished and a partisan Congress, under the stress of circumstances, gives the ballot to the liberated bondsmen. Reconstructed, the Southern States devote themselves to the task of rebuilding their wasted fortunes on old ruins and new conditions. The South recognizes the lesson of the war in its bearing on the nature of our Government, but refuses to recognize the capacity for political and social equality in the negro, and in the last

years of the nineteenth century enters upon a deliberate policy of negro disfranchisement through State legislation. In the North and West, the era is one of extraordinary material growth, and political questions of the time are largely economic—currency, tariff, labor, and monopoly. With the acquisition of the Spanish possessions in the Pacific, and the assumption of the task of building the interoceanic Panama Canal, the United States begins its career as a world power. See:

(a) The Restored Union:

Johnson, Andrew  
 Reconstruction  
 Freedman's Bureau  
 Carpet Baggers  
 Ku-Klux Klan  
 Knights of the Golden Circle  
 Force Bill  
 Tenure of Office Act  
 Stanton  
 Alaska  
 Chase, S. P.  
 Stevens, T.

(b) From the Close of the Civil War Period:

Grant, U. S.  
 Alabama Claims  
 Grange  
 Credit Mobilier of America  
 Virginius Massacre  
 Whisky Ring  
 Electoral Commission  
 Custer  
 Modoc  
 Sioux  
 Indians  
 Centennial Exhibition

Hayes, R. B.  
 Tilden

Strikes and Lockouts  
 Bland, R. P.  
 Greenbacks  
 Greely, H.

Garfield, J. A.

Arthur, C. A.

Harrison, B.

Bering Sea Controversy  
 Tariff  
 Hawaiian Islands

Cleveland, G.

Venezuela  
 World's Columbian Exposition

McKinley, Wm.

Blaine, J. G.  
 Reed, T. B.  
 Spanish-American War  
 Cuba  
 Philippines  
 Porto Rico  
 Trusts  
 Pan-American Exhibition.

Roosevelt, T.

Hay-Pauncefote Treaty  
 Panama Canal  
 Root, E.  
 Louisiana Purchase Exposition  
 Russo-Japanese War  
 Hughes, C. E.  
 Trusts  
 Lodge, H. C.  
 Poindexter, Miles

Taft, Wm. H.

Pugo  
 Knox, P. C.  
 Conservation  
 Trusts  
 Tariff  
 Lorimer, Wm.  
 Aldrich, N. W.

*Mexico, History*

La Follette, R. M.

Cummins, A. B.

Penrose, B.

Borah, Wm.

Wilson, W.

Bryan, Wm. J.

Parker, A. B.

Underwood, O.

Brandeis, L. D.

McAdoo, Wm. G.

Daniels, J.

Reserve Bank, Federal

*Mexico, History*

Tariff

Mann, J. P.

O'Gorman, J. A.

Newlands, F. G.

Kern, J. W.

Owen, R. L.

Gore, T. P.

Smith, Hoke

Stone, Wm.

War in Europe

Party Names

Money

Coinage

Labor Organizations

Arbitration

Railways (Interstate Commerce  
Act)

Trusts

Tariff

For the Historians:

Adams, C. F.

Adams, H.

Bancroft, G.

Bancroft, H. H.

Beard, C. A.

Brodhead, J. R.

Bryce, James

Burgess, J. W.

Channing, F.

Coffin, C. C.

Curtis, G. T.

Dodge, T.

Doyle, J. A.

Dunning, W. A.

Fiske, J.

Frothingham, R.

Gayarré, C.

Harris, H.

Hart, A. B.

Higginson, T. W.

Hildreth, R.

Holst, H. E. von

Johnston, A.

Lodge, H. C.

Lossing, B.

McMaster, J. B.

Palfrey, J. G.

Parkman, F.

Peter Martyr

Rhodes, J. F.

Robinson, J. H.

Ropes, J. C.

Schouler, J.

Shea, J. G.

Sloane, W. M.

Sparks, J.

Thorpe, F. N.

Thwaites, R. G.

Wilson, W.

Winsor, J.

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## Chapter 2. Law and Political Science

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**N**ATIONAL or Municipal law is commonly divided into two general classifications, Substantive Law, and Adjective or Remedial Law. Substantive Law prescribes and defines the normal relations of social and political life, that is, legal rights, obligations, and privileges, as distinguished from violations of the normal, legal order. (See Substantive Law.) Adjective or Remedial Law deals with abnormal conditions, such as crimes, and with the methods of enforcement of legal rights. Both of these classifications are severally divided into Public Law and Private Law. The title, Public Law, is applied to those subjects which have to do with the relations of individuals to the various branches of government. Private Law includes the rules governing the relations of individuals to each other, and their rights in and over property. While, for some purposes, Substantive and Remedial Law are so closely connected that a complete knowledge of one is not possible without an acquaintance with the other, yet, in general, it may be said that, for practical purposes, the average layman is concerned chiefly with the rules of Substantive Law, except, perhaps, Public Remedial Law—the Law of Crimes. For example, it is quite necessary that a person in business be somewhat familiar with the ordinary principles of the Law of Contracts, but it is not necessary that he should know how to proceed in law to obtain redress for the breach of a contract.

International Law is distinguished from Municipal Law, in that the former deals with the relations of nations with each other, and such rules of law as will be recognized by nations in dealing with the citizens of each other, while the latter deals with the relations of one nation to its citizens, and the relations of the citizens with each other. International Law is administered, generally, in the various courts of each nation when applicable, but the refusal of a nation to recognize any of its principles could only be met by a declaration of war on the part of the aggrieved nation or nations, whereas the sovereign power of a nation sanctions and enforces Municipal or National Law. Therefore, to avoid confusion, topics in International Law are placed in a separate classification.

For a General Discussion of the Nature and Purposes of Law, see:

Law	Municipal Law
Jurisprudence	Mercantile Law
Substantive Law	Military Law
International Law	

### A. Substantive Law

#### I. PUBLIC SUBSTANTIVE LAW.

This branch of substantive law is commonly divided into two general

classifications, CONSTITUTIONAL and ADMINISTRATIVE LAW. Constitutional law deals with the nature and powers of the Government, and correlatively with



the rights and privileges of citizens with reference to the Government. The name, **ADMINISTRATIVE LAW**, is applied to that portion which controls and regulates the enforcement of the will of the Government, as expressed by constitutions, statutes, etc.

### 1. CONSTITUTIONAL LAW :

Constitution  
 Constitutional Law  
 Constitution of the United States  
 Magna Charta  
 Amendment  
 Federal Government  
 Police Power  
 Veto  
 Eminent Domain  
 Bill of Rights  
 Civil Rights Bill  
 Bill of Attainder  
 Sovereignty  
 State  
 Ex post facto  
 Retroactive  
 Due Process of Law  
 Congress  
 Legislature  
 Legislation  
 Conflict of Laws  
 Act  
 Act of Parliament  
 Repeal  
 Citizen  
 Alien  
 Naturalization  
 Allegiance  
 Domicile  
 Alien and Sedition Acts  
 Expatriation  
 Expulsion  
 Liberty of Individual  
 Liberty, Religious  
 Emancipation

Reprieve  
 Territories  
 Consolidation Acts  
 Restraint of Trade  
 Interstate Commerce Act  
 Granger Cases  
 Concurrent Jurisdiction  
 Original Package  
 Income Tax  
 Inheritance Tax  
 Dartmouth College Case  
 Slaughter-House Cases  
 Dred Scott Case  
 Fugitive Slave Law  
 Homestead Laws  
 Poor Laws  
 Tenure of Office Act  
 Legal Tender Cases  
 Debt, Public  
 Convention  
 Election  
 Vote  
 Fishing Laws  
 Franchise

### 2. ADMINISTRATIVE LAW :

Administrative Law  
 Executive Department  
 State, Department of  
 Diplomacy  
 High Commission  
 Commission  
 Commissioner  
 Municipality  
 Municipal Government  
 Municipal Law  
 Municipal Ownership  
 Municipal Reform Acts  
 Civil Administration  
 Court  
 Supreme Court of U. S.  
 Courts, Military  
 Court Baron  
 Court of Session

County Court  
Common Bench  
Probate Court  
Petty Sessions  
District Court  
Sheriff's Court  
Ecclesiastical Court  
King's Bench  
Cassation, Court of  
Claims, Court of  
Instance, Court of  
Inns of Chancery  
Inns of Court  
Ordinance  
By-law  
Charter  
Building Acts  
Cemetery Laws  
Factor's Acts  
Intoxicating Liquors  
Grand Jury  
Justice, Lord  
Sheriff  
Justice of the Peace  
Marshal  
Coroner  
Assessors  
Auditor  
Alderman  
Attorney-General  
Surrogate  
Judge-Advocate  
Judge  
Referee  
Justice  
Justice, Department of  
Justice of the Peace  
Appointment

## II. PRIVATE SUBSTANTIVE LAW

For convenience this portion of the substantive law is divided into two classifications, the Law of Persons and the Law of Property.

### 1. LAW OF PERSONS:

In law, both natural persons and those creations of the law, such as corporations, known as legal entities, or juristic persons, are classed together in the Law of Persons, as the same general principles apply to them. Under the title **NATURAL PERSONS**, are grouped titles dealing with the peculiar privileges and disabilities of married women, infants, and persons of unsound mind. Topics dealing with the family relation are for convenience grouped together.

#### (a) *Natural Persons:*

#### I. Persons Exercising Incomplete or Special Rights:

Infant  
Minor  
Legitimacy  
Apprentice  
Disability  
Married Women  
Feme Coverte  
Coverture  
Insanity  
Lucid Interval  
Capacity

#### (b) *Family Relations:*

Husband and Wife  
Settlement  
Marriage  
Divorce  
Alimony  
Adultery  
Separation  
Abandonment  
Paraphernalia  
Community of Property  
Emancipation  
Separate Estate

Parent and Child

Adoption

Bastard

Ancestor

Affinity

Consanguinity

Domicile

Guardian

(c) Juristic Persons:

Company

Corporation

Ultra Vires

De Facto

Charitable Trusts

Ecclesiastical Corporation

Joint Stock Company

Limited Companies

Limited Liability

Regulated Companies

Stock Company

Dividend

Director

Trust

Trust Fund Doctrine

der the title, SUCCESSION AND INHERITANCE.

(a) *Real Property*:

i. Nature of Real Property:

Real Property

Real Estate

Hereditament

Tenement

Mines and Mining

Feudalism

Fee

Fief

Feud

Feu

Accession

ii. Systems of Tenure:

Tenure

Seisin

Manor

Socage

Frankalmoigne

Gavelkind

Ground-Annual

Demesne

Ancient Demesne

Borough English

Burgage Tenure

Tenant Right

Community of Property

Mortmain

Subinfeudation

Sergeanty

Landlord and Tenant

Attornment

Lease

Leasehold

Common, Tenancy in

Tenancy at Sufferance

Tenancy at Will

Rent

Occupancy

Mining Claim

2. LAW OF PROPERTY:

The term property includes everything that is the subject of possession and ownership, whether tangible or intangible. The various kinds of property are naturally divided into two classifications, REAL and PERSONAL. Real Property includes lands, tenements, and hereditaments, and interests therein. Subjects dealing with the disposition and incumbrance of real property *inter vivos* are also placed under this title. Personal Property includes all movable objects of property, commonly known as chattels, and such claims, obligations, and rights of action as are the subject of transfer. Topics treating of the transfer of property, both real and personal, by will or descent, are classed un-

Life Estate  
 Conditional Fee  
 Remainder  
 Reversion  
 Freehold  
 Dower  
 Curtesy  
 Entry, Right of  
 Entirety  
 Equity of Redemption  
 Equitable Estate  
 Riparian Rights  
 Rivers, Navigable and Non-navigable  
 Inclosures of Commons  
 Use and Occupation  
 License  
 Pew Rights

iii. Transfer and Incumbrance of Real Property:

Alienation  
 Incumbrance  
 Bargain and Sale  
 Conveyance  
 Conveyancing  
 Land Transfer, Reform in  
 Abstract of Title  
 Search of Title  
 Deed  
 Habendum  
 Restrictive Covenants  
 Conditional Limitation  
 Quit Claim  
 Lease and Release  
 Demise  
 Executory Devise  
 Shifting Use  
 Entail  
 Shelley's Case, Rule in  
 Enrollment  
 Power of Appointment  
 Power  
 Ejectment

Eviction  
 Adverse Possession  
 Common Assurance  
 Elegit, Estate by  
 Jointure  
 Escrow  
 Settled Estate  
 Tax Sale  
 Tax Title  
 Cloud on Title  
 Perpetuity  
 Prescription  
 Quit Rent  
 Office Found  
 Partition  
 Mortgage  
 Merger  
 Tacking of Mortgages  
 Mechanic's Lien  
 Servitude  
 Easement  
 Equitable Easement  
 Incorporal  
 Equitable Mortgage  
 Building Loans  
 Donis Conditionalibus  
 Domesday Book  
 Recording Acts  
 Recording of Deeds  
 Torrens System  
 Title, Registration of  
 Title Insurance

(b) *Personal Property:*

i. Possession:

Chattel  
 Movables  
 Confusion  
 Treasure-Trove  
 Chose in Action  
 Fixtures  
 Emblements  
 Estray  
 Good-Will

Finding  
Oysters, Law as to  
Wreck

ii. Patents, Patent Law:

Letters Patent  
Trademark  
Trade-name  
Copyright  
Literary Property  
Invention  
Caveat

iii. Contracts, Obligations, and Intangible Property Rights:

Contract  
Obligation  
Covenant  
Consideration  
Rescission  
Discharge  
Breach  
Subrogation  
Abrogation  
Suretyship  
Pledge  
Reward  
Guaranty  
Gift  
Claim  
Debt  
Creditor  
Commercial Law  
Debtor  
Payment  
Chose in Action  
Accord and Satisfaction  
Assignment  
Donation  
Joint Ownership  
Sale  
Bill of Sale  
Auction  
Market Overt

Caveat Emptor  
Delivery  
Condition and Conditional  
Vendor's Lien  
Lien  
Bailment  
Carrier, Common  
Baggage  
Bill of Lading  
Forwarding  
Consignment  
Stoppage in Transitu  
Joint Adventure  
Freight  
Negotiable Instruments  
Negotiable Paper  
Promissory Note  
Check  
Bill of Exchange  
Bank-Bills  
Exchequer Bills  
Bought and Sold Notes  
Specialty  
Bond  
Stock  
Coupon  
Credit, Letter of  
Warehouse Receipt  
Bottomry Bond  
Indorsement  
Dishonor  
Exchange  
Interest  
Agent  
Factor  
Partnership  
Mercantile Agent  
Mercantile Agency  
Master and Servant  
Joint Liability  
Insurance  
Life Insurance  
Accident Insurance  
Wager Policy

Account

Deposit

Voucher

Receipt

Seal

Notary Public

Acknowledgment

Debenture

*(c) Succession and Inheritance:*

Decedent

Estate

Inheritance

Intestacy

Distribution

Succession ab Intestato

Surveyorship

Primogeniture

Inventory

Administration

Will

Testament

Appraisement

Legacy

Residuary Legacy

Ademption

Advancement

Codicil

Share

Beneficiary

Per Stirpes

Devise

Personal Representative

Executor

Undue Influence

Deathbed, Law of

Heir

Heirloom

Accumulations

Lapse

Posthumous Child

## B. Remedial Law

### I. PUBLIC REMEDIAL LAW.

This portion of the Adjective, or Remedial, Law deals with crimes, the penalties therefor, and the method of prosecution of accused persons by the State. We shall first take up those topics which define particular crimes, under both statutes and the common law, and then those which deal with the prosecution and punishment of crimes. See:

#### Adjective Law

#### 1. Crimes, Misdemeanors, etc.:

Crime

Criminology

Criminal Law

Misdemeanor

Accessory

Accomplice

Infamy

Felony

Barratry

Blackmail

Blasphemy

Body-Snatching

Bribery

By-Bidding

Burglary

Embezzlement

Robbery

Stolen Goods

Receiving Stolen Goods

Assault and Battery

Security

Security of Person

Manslaughter

Homicide

Murder

Malpractice

Consent

Infanticide  
 Arson  
 Smuggling  
 Counterfeiting  
 Subornation of Perjury  
 Compounding of Felony  
 Suicide  
 Misprision  
 Treason  
 Overt Act  
 Malicious Mischief  
 Extortion  
 Forgery  
 Sunday  
 Gambling  
 Disturbance  
 Eavesdropping  
 Embracery  
 Engrossing  
 Forestalling  
 Monopoly  
 Harboring  
 Champerty  
 Concealment  
 Corrupt Practices  
 Simony  
 Piracy  
 Policy  
 Fornication  
 Rape  
 Incest  
 Rescue  
 Riot  
 Abortion  
 False Pretenses  
 Common Scold  
 Sumptuary Laws  
 Trading Stamps  
 Habitual Drunkard

Arraignment  
 Search  
 Bench Warrant  
 Search Warrant  
 Writ  
 Attainder  
 Autrefois Acquit  
 Benefit of Clergy  
 Capital Punishment  
 Charge and Specification  
 Commitment  
 Corporal Punishment  
 Corruption of Blood  
 Fine  
 Forfeiture  
 Hard Labor  
 Information  
 Indictment  
 Justification  
 Ordeal  
 Outlawry  
 Civil Death  
 Peine Forte et Dure  
 Penalty  
 Posse Comitatus  
 Nolle Prosequi  
 Prisoner  
 Prosecution  
 Prosecutor  
 Voir Dire  
 Punishment  
 Self Defense  
 Sentence  
 State's Evidence  
 Corpus Delicti  
 Ne Exeat  
 Torture  
 Extradition  
 Locus Delicti

**2. Criminal Procedure and Punishment of Crimes:**

Criminal Procedure  
 Arrest

**II. PRIVATE REMEDIAL LAW.**

This division of Remedial Law includes the law of Torts and Civil Practice and Procedure. Torts are

wrongs other than those arising out of contract, for which the injured party has a right of action. A tort action is not assignable and is not strictly a property right, and, therefore, the law of torts is properly considered remedial law. Under the title, Civil Practice and Procedure, are grouped all topics dealing with the enforcement of civil rights of action of a private nature.

### 1. TORTS, OR CIVIL WRONGS.

Conversion  
Trespass  
Assault  
Trover  
Fraud  
Fraudulent Conveyance  
Infringement  
Slander of Title  
Defamation  
Slander  
Libel  
Contribution  
Intimidation  
Accident  
Injury  
Misrepresentation  
Nonfeasance  
Nuisance  
Negligence  
Malfeasance  
False Imprisonment  
Malicious Prosecution  
Mayhem  
Pollution of Watercourses  
Criminal Conversation  
Employer's Liability  
Fellow-Servants

### 2. CIVIL PRACTICE AND PROCEDURE.

In English jurisprudence, three distinct systems of procedure, corresponding and adapted to distinct systems of jurisprudence, were developed respect-

ively by the courts of common law, the courts of chancery, and the courts of admiralty. The common law procedure is much older than the procedure in either equity or admiralty, as practiced by the English courts, the *curia regis*,—which was the forerunner of the English Courts of Exchequer, Common Pleas, and King's Bench, in which the common law procedure was developed,—having been established in the early part of the twelfth century. Procedure in equity is much simpler than procedure at common law. Its essential characteristics are based on the fact that the sole power of that court is to command things to be done, and not directly to transfer or otherwise affect the rights of litigants. Procedure in admiralty was founded upon the Roman law and corresponds in many particulars to the equity system. The embarrassment experienced as a consequence of the technical character of the common law procedure has led to many reforms by legislation.

Action  
Limitation of Actions  
Civil Action  
Civil Procedure  
Forms of Action  
Admiralty Law  
Equity  
Procedure  
Practice  
Pleading  
Process  
Code  
Code Napoléon  
Service of Papers and Process  
Next Friend  
Parties  
Name  
Plea



Common Counts  
Common Forms  
Common Plea  
Common Recovery  
Debt, Action of  
Detinue  
Assumpsit  
Foreclosure  
Replevin  
Bill in Equity  
Real Action  
Civil Death  
Claim  
Lawyer  
Attorney  
Advocate  
Barrister  
Counselor  
Solicitor  
Disbarment  
Client  
Plaintiff  
Defendant  
Respondent  
Joinder  
Writ  
Declaration  
Confession and Avoidance  
Answer  
General Issue  
Verification  
Demurrer  
Disclaimer  
Defense  
Forma Pauperis, In  
Cross-Bill  
Confession of Judgment  
Case  
Chambers  
Chancery  
Cestui que Trust  
Cestui que Use  
Master in Chancery  
Citation

Month  
Attachment  
Foreign Attachment  
Letters Rogatory  
Lis Pendens  
Oath  
Notary Public  
Precept  
Discovery, Bill of  
Cognovit  
Cognizance  
Color  
Subpœna  
Recoupment  
Ex Parte  
Distringas  
Garnishment  
Entry, Writ of  
Quia Timet  
Qui Tam Action  
Interrogatories  
Affidavit  
Bill of Particulars  
Certiorari  
Habeas Corpus  
Motion  
Inquiry, Writ of  
Inquisition  
In Personam  
In Rem  
Interpretation  
Interpleader  
Injunction  
Prohibition  
Special Proceeding  
Specific Performance  
Trustee Process  
Warrant  
Quo Warranto  
Intervention  
Invoice  
Bill of Peace  
Acknowledgment  
Civil Damage Acts

Forcible Entry and Detainer	Proof
District Attorney	Handwriting
Hilary Term	Testimony
Oyer and Terminer	Privilege
Venue	Privileged Communication
Judicature Acts	Laches
Jurisdiction	Dictum
Judge	Precedent
Jury	Res Adjudicata
Challenge	Presumption
Judge Advocate	Declaration or Affirmation
Oyer	Alteration
Stay	Access
Stare Decisis	Ambiguity
Damages	Argument
Day	Verdict
Marshalling	Special Verdict
Trial	Scotch Verdict
Mistrial	Judgment
Nonsuit	Award
Incident	Appeal
Judicial Notice	Bill of Costs
Evidence	Taxation of Costs
Exception	Bill of Exceptions
Circumstantial Evidence	Execution
Burden of Proof	Supersedeas
Condonation	Exemption
Admission	Sequestration
Examination	Distress
Cross Examination	Equitable Assets
Witness	Receiver
Expert	Winding Up of Company

## C. International Law

The subjects or persons of International Law are independent sovereign States or nations. The community constituting such State is permanently established for a political end, is possessed of a defined territory, and is independent of external control. If one or more of these elements be lack-

ing, the community is not a State in the sense of International Law. Individuals choose their associates, and States likewise determine whether and when they wish to maintain relations with a newcomer. A fundamental proposition of International Law is the equality of States, of which Chief Justice Mar-

shall said: "No principle of general law is more universally acknowledged than the perfect equality of nations. Russia and Geneva have equal rights. It results from this equality that no one can rightfully impose a rule on another." See:

International Law  
Treaty  
Diplomacy  
Diplomatic Agents  
Envoy  
Embassy  
Ambassador  
Neutrality  
Enemy  
Embargo  
Blockade  
Contraband  
Mare Clausum  
High Seas  
Territorial Waters  
Seashore

Tide Waters  
Bering Sea Controversy  
Extraterritoriality  
Prescription  
Privateering  
Piracy  
Award  
Convoy  
Extradition  
Foreign Judgment  
Foreign Law  
War; War in Europe; War Zone  
Truce  
Acts of Hostility  
Comity of Nations  
Mainprize  
Navigation, Freedom of  
Navigation Laws  
Recapture  
Retaliation  
Rules of the Road  
Salvage  
Seamen, Laws Relating to

## D. History and Miscellany

### 1. AGRARIAN LAW:

Anglo-Saxon Law  
Customary Law  
Common Law  
Civil Law  
Civil Church Law  
Twelve Tables  
Salic Law  
Scotch Law  
Spanish Law  
Oléron, Laws of  
Law Merchant

### 2. PARLIAMENTARY LAW:

Revised Statutes  
Medical Jurisprudence  
Maxims

### Legal Education

3. The following are a few of the names in the ranks of jurists, lawyers, and publicists of all time:

Austin, John  
Betts, S. R.  
Binney, Horace  
Black, J. S.  
Blackstone, William  
Bluntschli, J. K.  
Bodin, J.  
Bracton, Henry de  
Brougham, Lord  
Campbell, John  
Choate, Rufus  
Coke, Edward

Cooley, T. M.  
Curtis, G. T.  
Ellsworth, Oliver  
Erskine, Lord  
Fearne, Chas.  
Feuerbach, P. J. A.  
Field, D. D.  
Field, S. J.  
Filangieri, G.  
Fortescue, John  
Gans, E.  
Glanvill  
Grotius, Hugo  
Hale, Matthew  
Holt, John  
Janet, Paul  
Jeffreys, Lord  
Johnson, Reverdy  
Kent, James  
Laboulaye, E. L.  
Lamar, L. Q. C.  
Langdell, C. C.

Lieber, Francis  
Livingston, Edward  
Lowell, A. L.  
Maine, Henry  
Mansfield, Earl  
Marshall, John  
Montesquieu, C.  
Moore, J. B.  
Pardessus, J. M.  
Parsons, Theophilus  
Plowden, E.  
Pollock, F.  
Portalis, J. E. M.  
Pufendorf, S.  
Savigny, F. K.  
Smith, Goldwin  
Stephen, J. F.  
Story, J.  
Taney, R. B.  
Tocqueville, A. C.  
Wharton, F.  
Woolsey, T. D.

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# Chapter 3. Sociology

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## Sociology

**S**Ocial science presents a theoretical and a practical aspect, of which the latter, at the present time, is the more important. Speculation on the origins of social life, the evolution of social institutions, and the nature of existing social bonds has been rich in theories, diverse in view, but casting light on all the course of human development. Society has been variously regarded as an aggregate, an organization, or an organism, and accordingly as it has been regarded its rights and duties as against the individual have been outlined. The influence of the collective body and the collective mind on the body and mind of the individual forms one of the most fascinating topics of sociology, fascinating because of the close connection that may be established between individual and social progress. But as yet scarcely sufficient material has been collected to make social theory strictly scientific, and the greater interest, probably, attaches to what has been called the practical aspect of social science, the study, namely, of contemporary social conditions and the problems which they create. Thus it would not be far from the truth to call practical sociology, social pathology, for as a matter of fact the attention of the working sociologist is directed, in greater part, to the study of the ills of the social body, a study of those individuals and classes of individuals whose presence in the midst of society is a burden or a source of danger to society or the cause of misery to themselves. In this respect social science deals with the helpless and the vicious and is largely coincident with humanitarianism. Theoretical sociology is most closely allied to Anthropology and History, going to the latter for its evolutionary data and to the former for origins. Practical sociology depends very largely on statistics.

I. The methods and theories of sociology are treated at length under that heading, supplemented by minor articles on subsidiary topics. This article, therefore, should be made the starting point on reading. See:

Sociology  
Man, Science of  
Anthropo-geography  
Acclimatization  
Environment  
Standard of Living  
Crowd

A discussion of various social institutions which form part of the data

of the sociologist, such as the Family, Marriage, the Tribe, etc., will be found in the chapter on Anthropology and Ethnology.

II. 1. Taking human aggregates as its subject matter, practical sociology draws the greatest uses from statistics. The gathering of statistical data is being initiated wherever governments have as yet failed to assume the office, and where official enumerations prevail their scope is constantly being widened. The study of population is now well advanced. See:

Demography  
Census  
Population  
Vital Statistics  
Births, Registration of  
Illiteracy  
Transportation, Penal  
Immigration  
Emigration  
Migration  
Colony  
Oriental Immigration  
Naturalization  
Suicide  
Infanticide  
Divorce  
Marriage  
Statistics

Charitable Trusts  
Rockefeller Foundation  
Rockefeller, J. D.  
Rockefeller, J. D., Jr.  
Carnegie, A.  
Charities  
Charities and Correction, National  
Conference of  
Charity Organization Society  
Brinkerhoff, Roeliff  
Elberfeld System  
Blind, Education of the  
Keller, H. A.  
Perkins, T. H.  
Bridgman, L.  
Howe, S. G.  
Deaf Mute (*Institutions*)  
Gallaudet, E. M.  
Insane Asylum  
Insanity  
Idiocy  
Mental Defectives  
Mental Pathology  
Medical Jurisprudence  
Bedlam  
Degeneracy  
Jukes, The

2. "Dependents, Defectives, Delinquents," adequately describes the subjects dealt with by the social pathologists. In this immensely broad field, private efforts coöperate with State activity, the former through investigations and advocacy largely, the latter through remedial legislation and the use of State resources. For a study of the dependent and defective classes, see:

Dependents, Defectives, Delinquents  
Social Debtor Classes  
Debt  
Pauperism  
Poor Laws  
Poor Rate  
Casual Poor  
Mendicancy  
Eugenics  
Tramp  
Vagrant  
Unemployment  
Workhouse  
Alms-house

3. Of dependent classes, children, naturally, absorb a large share of the attention of the sociologist and the charity worker. The mission here is not one of relief only, but of redemption, and successful effort in this field discounts future dangers to society. See:

Dependent Children  
Foundling Hospital  
Penology  
Crèche  
Marbeau, J. B.  
Infant School  
Ragged Schools  
Rauhes Haus

George Junior Republic  
 Parks and Playgrounds  
 Juvenile Court  
 Juvenile Offenders  
 Lindsey, B. B.  
 Children, Societies for  
 Cruelty to Children, Prevention of  
 Children's Aid Society  
 Schools  
 Wirt, Wm. A.

4. Sufficient reason exists for speaking of a criminal class to make Criminology an independent branch of investigation with something of the methodology of a science. The delinquent, the criminal, is regarded as at war with society. The causes that have changed the course of nature in him and made him anti-social may be heredity or environment or both. The prevention and punishment of crime and the possible reformation of the criminal form the subject matter of the "science." See:

Criminology  
 Lombroso, Cesare  
 Bertillon System  
 Finger Prints  
 Punishment  
 Corporal Punishment  
 Flogging  
 Penology  
 Capital Punishment  
 Prisons  
 Osborne, T. M.  
 Convict  
 Convict Labor  
 Clinton State Prison  
 Newgate  
 Fleet Prison  
 Millbank Prison  
 Bicêtre  
 Conciergerie

Transportation, Penal  
 Botany Bay  
 Bagnes  
 Recidivists  
 Reformatories  
 Elmira Reformatory  
 Juvenile Offenders  
 Brockway, Z. R.  
 Ticket of Leave  
 Mettray  
 Beccaria, C. B.  
 Howard, John  
 Round, W. M.  
 Fliedner, T.  
 Fry, Elizabeth  
 Prison Association, American  
 Prison Buildings  
 International Prison Congress

5. The vices of individuals, as well as of classes, affect the welfare of the body politic. (a) The standard of personal purity is rising with the general heightening in moral tone. (b) The evils resulting from the abuse of liquor have led to one of the most notable movements of the nineteenth century. See:

- (a) Family
  - Marriage
  - Divorce
  - Infanticide
  - Syphilis
  - Concubinage
  - Eugenics
  - Celibacy
  - Illegitimacy
  - Bastard
  - Prostitution
  - White Slavery
- (b) Intoxicating Liquors
  - Intoxication
  - Temperance
  - Prohibition

Prohibition Party (Under Temperance)

License

Liquor Traffic

Excise

Local Option

Gothenburg System

Abstinence Societies

Mathew, T.

Dow, N.

Gough, J. B.

Keeley, L.

Chafin, E. W.

Lend-a-Hand Clubs

Loyal Temperance League

Woman's Christian Temperance Union

World's Woman's Christian Temperance Union

Temperance, Sons of

Good Templars, Independent Order of

6. The problem of remedying social evil has drawn the attention of men in all ages, and thinkers have been fond of busying themselves with the construction of ideal forms of society since the days of Plato. More than philosophers' dreams, however, are the great social movements of modern times, whose aim is the reorganization of society on a different basis than that of the present—private property.

(a) For the literary utopias, see:

Plato (The Republic)

Campanella (The City of the Sun)

Defoe, Daniel (An Essay on Projects)

Morc, Thomas (Utopia)

Harrington, James (Oceana)

Bellamy, Edward (Looking Backward)

Bacon, Francis (New Atlantis)

Fénelon, François (Voyage dans l'Île des Plaisirs)

(b) For Communism, see:

Communism

Communitic Societies

Socialism

Shakers

Owen, Robert

Blanc, J. J. L.

Harmonists

New Harmony

Cabet, Etienne

Icarians

Saint-Simon, C. N.

Fourier, F. M. C.

Anarchism

Wells, H. G.

Brook Farm

Hopedale

Oneida Community

Zoar Community

Koreshan Ecclesia

Amana

Noyes, J. H.

Perfectionists

Taborites

Moravians

Anabaptists

Separatists

Ephrota

(c) For Socialism, see:

Socialism

Collectivism

Fourierism

Nationalism

Communism

Value

Capital

Industrial Revolution

Debs, E. V.

Berger, V. L.

National Workshops



Saint-Simon, C. H.

Fourier, F. M. C.

Rodbertus, J.

Enfantin, B. P.

Bazard, A.

Considérant, V. P.

Babeuf, F. N.

Proudhon, P. J.

Blanc, J. J. L.

Marx, Karl

Lassalle, F.

Engels, F.

Internationale

Weitling, W.

Liebknecht, K.

Liebknecht, W.

Gronlund, L.

Bellamy, E.

Bebel, F. A.

Vollmar, G. H.

Bernstein, E.

Malon, B.

Godin, J. B. A.

James, E. J.

Millerand, A.

Jaurès, J. L.

Briand, A.

Gronlund, Lawrence

Morris, Wm.

Hyndman, H. M.

Fabian Society

Webb, S.

Kelly, E.

Loria, A.

Wagner, A.

Schmoller, G.

Shaw, G. B.

Nieuwenhuis, D.

Sabotage

(d) For Anarchism, see:

Anarchist

Bakunin, M.

Godwin, William

Proudhon, P. J.

Tucker, B. R.

Hess, Moses

Syndicalism

Industrial Workers of the World

Ferrer

Most, Johann

Nihilism

Michel, Louise

(e) For quasi-socialistic movements,  
see:

(a) Municipal Ownership

Single Tax

George, Henry

(b) Coöperation

Rochdale Pioneers

Consumers' League

Profit Sharing

Leclaire, E. J.

7. Socialism is heterodox in exalting the State over the individual, yet there is rapidly growing recognition of the right of the State to intervene for the protection of the working classes, and to assume functions tending to further their welfare. See:

Factory Inspection

Labor Legislation

Employers' Liability

Employment Bureau

Social Insurance

Labor Church

Labor Colonies

Labor Congresses

Labor Day

Labor Organizations

Labor Party

Labor Problems

Labor Exchange

Child Labor

Sweating System

Lodging Houses

Housing Problem

Tenement House Problem  
 Bath Houses, Municipal  
 Postal Savings Banks  
 Old Age Pensions  
 Vacant Lot Farming

8. A recent development of social work is the settlement house established in the congested district of great cities to act as a centre of physical and moral uplifting. See:

Social Settlements  
 People's Palace  
 Toynbee, Arnold  
 Hull House  
 Addams, Jane  
 Boys' Clubs  
 Fresh-Air Work  
 George Junior Republic

See also: Salvation Army; Booth, Charles; Pullman; Krupp Foundries, Social Work at; Y. M. C. A.; Y. W. C. A.

9. For a problem specifically American, see:

Negro in America  
 Negro Education  
 Hampton Normal and Agricultural Institute  
 Tuskegee Normal and Industrial Institute  
 Washington, Booker T.

Societies in the narrow sense, associations, that is, of individuals, for the attainment of a common aim, have always existed, illustrating in the miniature the gregarious nature of man. Their purpose may be various, social, political, religious, educational, or protective. See for types of each:

Societies  
 Club  
 Benefit Societies

Friendly Society  
 Building and Loan Associations  
 Secret Associations  
 Burschenschaft  
 Carbonari  
 Mafia  
 Camorra  
 Fenian Society  
 Patriotic Societies  
 Orders  
 Templars, Knights  
 Hospitalers  
 Brotherhoods, Religious  
 Jesuits  
 Societies for Ethical Culture  
 Fraternities, American College Academy  
 Institute of France  
 Royal Society  
 Historical Associations, American  
 Masons, Free  
 Odd Fellows, Independent Order of  
 Pythias, Knights of  
 Elks, Benevolent and Protective Order of  
 Hibernians, Ancient Order of  
 Industrial Workers of the World

10. A partial list only of writers and investigators in sociology would include:

Addams, Jane  
 Althusius, Johannes  
 Ammon, Otto  
 Angell, George Thorndike  
 Appert, B. N. M.  
 Barth, Paul  
 Barton, Clara  
 Baxter, Robert D.  
 Bebel, F. A.  
 Birkbeck, George  
 Bodin, Jean  
 Booth, Charles  
 Buckle, Henry T.

- Burdett-Coutts, A. G.  
Burdett-Coutts, W. L. A.B.  
Buxton, Sir Thomas F.  
Considérant, V. P.  
Cooper, Peter  
Coram, Thomas  
Crandall, Prudence  
Darling, Grace  
Durkheim, E.  
Enfantin, B. P.  
Fairbanks, Arthur  
Faithfull, Emily  
Folks, Homer  
Fourier, François C. M.  
Fry, Elizabeth  
Galton, Sir Francis  
Giddings, F. H.  
Girard, Stephen  
Godin, Jean B. A.  
Gompers, Samuel  
Gumplowicz, Ludwig  
Gurney, J. J.  
Guy, Thomas  
Hanway, Jonas  
Henderson, C. R.  
Hill, Octavia  
Hill, Sir Rowland  
Hobhouse, L. T.  
Holyoake, G. J.  
Howard, John  
Kidd, Benjamin  
Kyrle, John  
Lassalle, Ferdinand  
Le Bon, G.  
Le Play, P. G. F.  
Liebknecht, K.  
Liebknecht, W.  
Livermore, M. A.  
Lloyd, Henry D.  
Mathew, Theobald  
Montefiore, Sir Moses H.  
Montyon, A. J. B.  
Moon, William  
Mott, Lucretia  
Neale, Edward V.  
Pinkerton, Allen  
Rowton, M. W. L.  
Sadler, M. T.  
Schäffle, A.  
Schulze-Delitzsch, H.  
Seligman, E. R. A.  
Sharp, Granville  
Smith, Gerrit  
Stuckenbergh, J.  
Tarde, G.  
Torrens, W. T. McC.  
Toynbee, Arnold  
Ward, Lester F.  
Waugh, Benjamin  
Webb, Sidney  
Willard, Frances E.  
Wines, F. H.  
Worms, René

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# Chapter 4. Political Economy

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## Political Economy

Political Economy has been briefly defined as the science of wealth, but this definition requires a further explanation of the peculiar sense in which the term wealth is employed. Wealth has been defined as the body of things that have value, but here again value in the economic sense has a narrower meaning than in ordinary use. Value, in economic discussion, usually means power in exchange, that is, the power of a commodity to command other commodities in exchange. Such attempts at brief definition, however, are not satisfactory, since each primary concept of the science is itself the text for long discussion. The best introduction to the subject will be found in the article, **POLITICAL ECONOMY**, which outlines clearly the content or scope, the relation of political economy to other branches of study, and the methods of investigation or arrangement that it employs.

I. The fundamental principles should then be studied by reference to the following articles:

Wealth  
Production  
Labor  
Division of Labor  
Industrialism  
Wages  
Money  
Bank, Banking  
Standard of Living  
Capital  
Interest  
Usury  
Rent

Tax  
Single Tax  
Métayer  
Profit  
Monopoly  
Speculation  
Consumption  
Value  
Coöperation  
Distribution  
Exchange  
Tariff

The history of economic thought should be studied next. In ancient and mediæval times political economy was not marked off from other branches of learning, and no attempt was made to study it systematically. From the historical paragraphs in the article, **POLITICAL ECONOMY**, it will be seen that to the Greek and Roman philosophers, as well as to the mediæval churchmen, the laws of trade were of interest mainly in their moral bearings. Even in the eighteenth century, when some of its principles were understood, and something like a systematic study was attempted, its scope and importance were not realized. It was regarded as a branch of statecraft. Not private wealth, but the best means of increasing financial power of the state was the main object of investigation. For an account of the various systems of economic thought, and the contributions of individual economists, see the following:

Mercantilism  
Physiocrats  
Laissez-Faire

Manchester School  
 Free Trade  
 New Freedom  
 Open Door  
 International Trade  
 Protection  
 Balance of Trade  
 Navigation Laws  
 Tariff  
 Quesnay, F.  
 Smith, Adam  
 Ricardo, D.  
 Malthus, T. R.  
 Thünen, J. H. von  
 Say, J. B.  
 Carey, H. C.  
 Bastiat, F.  
 Mill, J. S.  
 Cairnes, J.  
 Jevons, W. S.  
 Walker, F. A.  
 Marshall, Alfred  
 Boehm von Bawerk, E.  
 Clark, J. B.  
 Wagner, Adolf  
 Schmoller, G.  
 Menger, K.  
 Nicholson, J. S.  
 Patten, S. N.

Obviously the study of past economic conditions is essential to an understanding of the present. On the general subject of Industrial Evolution consult the following:

Manufactures  
 House Industry  
 Mir  
 Guild  
 Hanseatic League  
 Merchants Adventurers  
 Mercantilism  
 Physiocrats  
 Industrial Revolution

Factories and the Factory System  
 Cartwright, E.  
 Open Field System  
 Agriculture  
 Hargreaves, J.  
 Arkwright, Sir R.  
 Crompton, Samuel  
 Watt, James  
 Whitney, Eli  
 Spinning  
 Weaving  
 Wool  
 Cotton  
 Loom  
 Textile Manufacturing  
 Eight-Hour Day  
 (See UNITED STATES, GREAT  
 BRITAIN, GERMANY, etc., for economic evolution of those countries.)

II. Reading the above topics in the order given will have supplied the theoretical and historical basis for the study of actual conditions, practical questions, and proposed measures of reform, which are arranged logically in the following lists:

#### 1. TRADE AND TRANSPORTATION:

Commerce  
 Barter  
 Chamber of Commerce  
 Imports and Exports  
 Demand and Supply  
 Exchange  
 Foreign Money  
 Ad Valorem  
 Coasting Trade  
 Competition  
 International Trade  
 Balance of Trade  
 Stock Exchange  
 Bond  
 Stock

Bucket Shop  
Customs Duties  
Lloyds  
Underwriter  
Crisis, Economic  
Speculation  
Transportation  
Railways  
Express Company  
Baggage  
Commerce Court  
Treaty  
Commercial Treaties  
Reciprocity  
Tariff  
Geography, Economic  
Mercantile Agency  
Port of Entry  
Pooling  
Labor and Commerce, Department  
of  
Municipal Ownership

See also statistics of Commerce and  
Railways under the various countries,  
as UNITED STATES, GREAT BRITAIN,  
CHILE, etc.

## **2. LABOR AND CAPITAL:**

Trade Unions  
Labor  
Capital  
Labor and Capital, Relations of  
Socialism  
Communism  
Anarchism  
Political Economy  
Division of Labor  
Labor Organizations  
Knights of Labor  
Labor, American Federation of  
Industrial Workers of the World  
Wages  
Minimum Wage  
Labor Union, The American

Railway Brotherhoods  
Typographical Union of North  
America  
Letter Carriers, National Associa-  
tion of  
Metal Trades Association  
Miners, Western Federation of  
Mine Workers of America  
Labor Representation Committee  
Labor Party, British  
Manufactures  
Strikes and Lockouts  
Industrial Arbitration and Concilia-  
tion  
Sabotage  
Syndicalism  
Eight-Hour Day  
Standard of Living  
Union Label  
Interlocking Directorates  
Boycotting  
Lockout  
Picketing  
Labor Problems  
Labor Colonies  
Labor Congresses  
Contract Labor Law  
Labor Day  
Labor Legislation  
Labor, Department of  
Labor Church  
Industrial Revolution  
Sweating System  
Employment Bureau  
Labor Exchanges  
Labor, Bureaus of  
Child Labor  
Employers' Liability  
Workingmen's Compensation  
Accidents, Industrial  
Factory Inspection  
Social Democracy  
Shops  
Injunction

### 3. GOVERNMENTAL REGULATION AND ENCOURAGEMENT OF COMMERCE AND INDUSTRY:

Protection  
Customs Duties  
Tariff  
Drawback  
Warehousing System  
Mercantilism  
Industrial Commission  
Latin Union  
Hamilton, Alexander  
List, Friedrich  
Balance of Trade  
Corn Laws  
Anti-Corn-Law League  
Cobden Club  
Reciprocity  
Shipping Subsidies  
Coasting Trade  
Monopoly  
Trusts  
Trust Fund Doctrine

### 4. MONEY AND CREDIT:

Money  
Precious Metals  
Foreign Money  
Bullion  
Coinage  
Numismatics  
Index Numbers  
Tabular Standard  
Bimetallism  
Latin Union  
Monetary Conferences  
Monetary Commission  
Gresham, Sir Thomas  
Gresham's Law  
Greenbacks  
Currency  
Greenback Party  
Specie Payments, Suspension and  
Resumption of

Fiat Money  
Credit  
Credit, Letter of  
Crisis, Economic  
Interest  
Bank, Banking  
Land Banks  
Clearing-House  
Trust Companies  
Bill of Exchange  
Exchequer Bills  
Crédit Foncier  
Mortgage Banks  
Rural Credit  
Reserve Bank, Federal

### 5. TAXATION AND FINANCE:

Finance  
Tax, Taxation  
Debt, Public  
Independent Treasury  
Repudiation  
Tariff  
Customs Duties  
Excise  
Internal Revenue System  
Budget  
Income Tax  
Land Tax  
Special Assessment  
Single Tax

See also sections on *Finance* under  
the various countries, as UNITED  
STATES, GREAT BRITAIN, BRAZIL, etc.

### 6. INSURANCE AND SAVINGS INSTITU- TIONS:

Insurance  
Life Insurance  
Fraternal Insurance  
Fire Insurance  
Marine Insurance  
Friendly Societies  
Workingmen's Insurance

Tontine  
 Underwriter  
 Annuity  
 Savings Banks  
 Post Office Savings Bank  
 Trust Companies  
 Building and Loan Associations

7. AMONG PROMINENT ECONOMISTS,  
 in addition to those already named in  
 the lists, are the following:

Achenwall, Gottfried  
 Adams, H. C.  
 Aguado, A. M.  
 Anderson, James  
 Ashley, W. J.  
 Astor, John Jacob  
 Atkinson, Edward  
 Bagehot, Walter  
 Baring  
 Baring, A.  
 Bastable, C. F.  
 Bastiat, F.  
 Bates, Joshua  
 Baudrillart, H. J. L.  
 Baxter, Robert D.  
 Beckmann, Johann  
 Bemis, Edward W.  
 Biddle, Nicholas  
 Blanqui, J. A.  
 Block, Maurice  
 Bodin, Jean  
 Boehm von Bawerk, E.  
 Boisguilbert, P. le P.  
 Brentano, L. J.  
 Cairnes, John E.  
 Carey, Henry C.  
 Carli, G. R.  
 Cernuschi, Henri  
 Chevalier, M.  
 Child, Sir Josiah  
 Clark, John B.  
 Cobden, Richard  
 Cohn, Gustav

Cooke, Jay  
 Cossa, Luigi  
 Courcelle-Seneuil, J. G.  
 Cournot, A. A.  
 Decker, Sir Matthew  
 Dewey, Davis R.  
 Drexel, Anthony J.  
 Ely, Richard T.  
 Engel, Ernst  
 Farr, William  
 Farrer, T. H.  
 Faucher, J.  
 Fawcett, Henry  
 Ferraris, C. F.  
 Field, Cyrus F.  
 Fisher, I.  
 Fisk, James  
 Fix, Théodore  
 Frick, H. C.  
 Gage, L. J.  
 Galiani, F.  
 Garnier, J. C.  
 Genovesi, A.  
 Giffen, Sir Robert  
 Gioja, M.  
 Giovanitti, A. M.  
 Girard, Stephen  
 Glass, Carter  
 Gould (family)  
 Gournay, J. C. M. V.  
 Hadley, A. T.  
 Hamilton, Robert  
 Harriman, Edward H.  
 Haxthausen, A.  
 Hermann, F. B. W.  
 Hewitt, A. S.  
 Hill, James J.  
 Hobson, J. A.  
 Horner, F.  
 Horton, S. D.  
 Howe, S. G.  
 Hudson, G.  
 Hufeland, G.  
 Ingram, J. K.



Jenks, J. W.  
 Jevons, W. S.  
 Kay, Joseph  
 King, Wm. L. M.  
 Knox, J. J.  
 Laing, S.  
 Laughlin, J. L.  
 Laveleye, Emile  
 Law, John  
 Le Play, P. G. F.  
 Leroy-Beaulieu  
 Leslie, T. E. C.  
 Levasseur, E.  
 Levi, Leone  
 List, F.  
 Loria, A.  
 McCulloch, J. R.  
 Mackay, C. W.  
 Macleod, H. D.  
 Malthus, T. R.  
 Marshall, A.  
 Mayo-Smith, R.  
 Menger, Karl  
 Morgan, J. P.  
 Mun, Thomas  
 Necker, Jacques  
 Newmarch, William  
 Nicholson, J. S.  
 North, Sir Dudley  
 Oncken, August  
 Overstone, S. J. L.  
 Parien, M. L. P. F. E.  
 Paterson, Wm.  
 Peabody, G.  
 Pender, Sir John

Petty, Sir William  
 Price, Richard  
 Quesnay, F.  
 Raiffeisen, F. W.  
 Rau, K. H.  
 Rogers, J. E. T.  
 Roscher, W. G. F.  
 Rothschild  
 Say, J. B.  
 Say, L.  
 Schäffle, A. E. F.  
 Schmoller, G.  
 Schulze-Delitzsch, F. H.  
 Seeborn, F.  
 Seligman, E. R. A.  
 Senior, N. W.  
 Soetbeer, A.  
 Sumner, W. G.  
 Taussig, F. W.  
 Tooke, Thomas  
 Torrens, Robert  
 Tucker, Josiah  
 Vanderbilt (family)  
 Wagner, Adolf  
 Wagner, H.  
 Walker, F. A.  
 Walker, R. J.  
 Walrus, M. E. L.  
 Watkin, Sir E. W.  
 Wells, D. A.  
 Wolowski, L. F. M. R.

8. FOR ECONOMIC AND SOCIAL RE-  
 FORM MOVEMENTS, see section 6 of  
 the preceding division (Sociology).

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## Chapter 5. Anthropology

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**T**AKEN in its broadest signification, Anthropology, the science of Man, would include within its scope all the sciences and arts as dealing with particular phases only of the history of human life on earth. Physiology, Psychology, Philosophy, Linguistics and Literature would then be proper fields of study for the anthropologist, as to a large extent they are. But the field of human knowledge is so broad, and the scope of every particular science in fact so extensive, that in the nature of things no single mind can at the present day carry on the work of scientific investigation in more than a limited field of inquiry. Practically, therefore, anthropology, with its allied science of ethnology, has become the study of a man as a zoölogical genus, and secondly, the study of the origins of culture as deduced from ancient remains and the testimony afforded by surviving savage races whose life has as yet undergone no such differentiation as to put it beyond the study of a single mind. Among them are sought the germs of present institutions and beliefs, which are followed up until they become the things of which history takes cognizance. Primitive life, then, is largely the subject of anthropology which deals also with survivals of primitive modes of life and methods of thought in our own times. Thus the topic of Folklore and Customs falls fairly within its field. See:

Man, Science of  
Anthropology  
Ethnography

1. The study of human anatomy and physiology is of primary importance in the science of man. On the basis of morphological and physiological peculiarities, various classifications of mankind have been made, and our knowledge of prehistoric man is largely a matter of skulls and thigh bones. The measurement of the human body has become a science in itself. See:

Somatology  
Cranimetry  
Skin  
Mongolian Spots  
Anthropometry  
Melanism and Albinism  
Hair  
Giants

Dwarf  
Skull

2. Remains of prehistoric man have been found in both hemispheres, but most plentifully in Europe. Ingenious comparative studies allow us to arrive at a fair conception of the physical characteristics of the earliest inhabitants of the world. See:

Barrow  
Mound-Builders  
Megalithic Monuments  
Dolmen  
Avebury  
Stonehenge  
Spy  
Chelléan  
Cro-Magnon  
Furfooz Race  
Hallstatt Epoch  
Madeleine, La

Mousterian Epoch  
 Neanderthal Man  
 Lansing Man  
 Kitchen-Midden

3. For the great divisions of mankind determined on the basis of physical characteristics and geographical distribution, see:

Caucasian Race  
 Europe, Peoples of  
 Mediterranean Race  
 Mongolian Race  
 Negro  
 Indian Peoples  
 Malayan Peoples  
 Melanesians  
 Indians, American  
 Mixed Races

4. On the question of the origin of mankind there has been much disputation among anthropologists with little positive results. See:

Evolution  
 Pithecanthropus

5. Man has nowhere been found in complete isolation. From the first he appears as the social being with his life conditioned by the co-existence of others of his kind. Co-existence meant likeness of thought and experience and the necessity of intercommunication. Our interest, therefore, turns to language. See:

Language  
 Philology  
 Gesture Language  
 Sign Language  
 Writing  
 Hieroglyphics  
 Cuneiform Inscriptions  
 Wampum

6. In common with the animals

man is early engaged in a struggle for the material needs of existence, with greater needs to satisfy, however, than the animals, and consequently with growing resources.

(a) The desire for food is the primal motive in life. See:

Cannibalism  
 Geophagy  
 Cookery  
 Pottery

(b) According to the nature of the physical conditions amidst which he dwelt, man found shelter for himself. See:

Tent  
 Wigwam  
 Cave-Dwellers  
 Cliff-Dweller  
 Mesa  
 Earth Lodge  
 Lake Dwellings  
 Archæology, American  
 Casa Grande  
 Oaxaca, Ruins of  
 Palenque  
 Nomad  
 Gypsies

(c) Dress, it is well established, came from no need of protecting the body, but had its origin in ornament. See:

Dress  
 Tattooing  
 Headdress  
 Hairdressing

7. Man entered upon a rapid course of development when, in his search for sustenance and shelter, he began the use of tools. See:

(a) For Implements:  
 Flint Implements

Celt  
Stone Age  
Bronze, Age of  
Archæology, American  
Paleolithic Period

(b) For Weapons:

Arrow  
Blowgun  
Tomahawk  
Boomerang  
Scalping

For the beginnings of the agricultural stage, see:

Agriculture  
Plow  
Domestic Animals

8. The religion of primitive man is essentially the belief in a universally animated world, a world of spirits, to combat and placate whom is the business of his life. See:

Animism  
Totemism  
Superstition  
Religion, Comparative  
Magic  
Necromancy  
Oracle  
Nature-Worship  
Fire-Worship  
Phallicism  
Fetishism  
Shamanism  
Amulet  
Manitou  
Demonology  
Demonic  
Satanism  
Voodoo  
Ghosts  
Fast  
Sacrifice

9. Birth and death are naturally portentous phenomena to the primitive mind, and are marked, death especially, by various ceremonies. In case of death the rites connect themselves with the belief in existence beyond the grave. See:

Couvade  
Circumcision  
Teknonymy  
Infanticide  
Mortuary Customs  
Burial  
Cist-burial  
Suttee  
Coffin

10. The origin of the family relation is a subject of much controversy; and the older view that, preceding the present organization of the family under the authority of the father and conditioned by the element of property, mankind passed through a stage in which the family centered around the mother, in whom authority was vested, and from whom descent was traced has been abandoned. See:

Marriage  
Matriarchate  
Partriarchate  
Polygamy  
Polyandry  
Levirate Marriage  
Clan  
Tribe  
Totemism  
Caste  
Exogamy  
Miscegenation  
Slavery

11. Primitive morality is often regarded as utilitarian and narrow in the scope of its application; but a

great deal of data has accumulated to negate this interpretation. In primitive life the social group is independent politically and, hence, frequently hostile with its neighbors, but this is not essentially different from civilized governments. Internally each of these primitive groups is governed by a legal code. Primitive law is summed up in custom. See:

Law  
Custom  
Taboo

12. Energy not directed towards the direct satisfaction of material wants finds expression among savages in games and sports. *Æsthetics*, modern research goes to show, had its origin in play. See:

Art, Primitive  
*Æsthetics*  
Swastika  
Festivals  
Dancing  
Corroboree  
Sun Dance  
Snake Dance  
Music  
Areois  
Potlatch

13. The survival of primitive thought in custom, legend, superstition, and common practices shows how continuous is the line of development from the mental life of primitive man to our own. For the entire subject of folk lore, see:

Folklore  
Nursery Lore  
Nursery Rhymes  
Superstition  
Magic

Witchcraft  
Incantation  
Vampire  
Werwolf  
Griffin  
Dragon  
Unicorn  
Mermaid  
Fairy  
Morgan, the Fay  
Avalon  
Goblins  
Oberon  
Puck  
Robin Goodfellow  
Baring-Gould, S.

14. The data of anthropology have been collected from many sources, and the outline of the principles of the science may be filled in with concrete detail, by referring to the many descriptive articles on the primitive peoples. Of the most interesting primitive groups for the anthropologists, a partial list would be the following:

(a) For America, see *INDIANS*, *AMERICAN*, an elaborate study which may be carried into great detail by following out the cross references to every tribe of North, Central, and South America. See also *ESKIMO*.

(b) For Asia:

Philippine Islands  
Aino  
Andamanese (under Andamans)  
Sundanese (under Sunda Islands)  
Dyak  
Gonds  
Gurkhas  
Khonds

Karens  
 Mois  
 Miao-Tse  
 Shans  
 Thai  
 Todas  
 Veddas  
 Baluchis (under Baluchistan)  
 Bhil  
 Bedouin  
 Kurds  
 Buriats  
 Giliaks  
 Kalmucks  
 Golds  
 Kirghiz  
 Koriaks  
 Ossetes  
 Tchuktchi  
 Tchuvashes  
 Tatars  
 Ugrians  
 Uzbeks  
 Vedahs  
 Yakuts  
 Yukagirs  
 Malayan Peoples  
 Polynesians  
 Melanesians  
 Micronesians  
 Negritos

(c) For Africa:

Akka  
 Bantu  
 Bejas  
 Berber  
 Kabyles  
 Bushmen  
 Hottentots  
 Kafirs  
 Dinka  
 Fellah  
 Masai

Hausa (under Hausa States)  
 Niam Niam  
 Somali  
 YOLOF  
 Yoruba  
 Zulus (under Zululand)

(d) For Australasia:

Australians (under Australia)  
 Maoris  
 Tasmanians (under Tasmania)

(e) For Europe:

Europe, Peoples of  
 Basque Race  
 Gypsies  
 Lapps (under Lapland)

15. A partial list of well-known anthropologists would include the following names:

Andre, R.  
 Bandelier, A. F. A.  
 Bastian, A.  
 Beauchamp, W. M.  
 Berendt, K. H.  
 Boas, F.  
 Brinton, D. G.  
 Broca, P.  
 Catlin, G.  
 Cushing, F. H.  
 Faidherbe, L. L. C.  
 Flower, W. H.  
 Fritsch, G. T.  
 Furness, W. H.  
 Gatschet, A. S.  
 Haddon, A. C.  
 Hale, H.  
 Hartmann, R.  
 Hodge, F. W.  
 Holmes, W. H.  
 Kanitz, F. P.  
 Kroeber, A. L.  
 Laufer, B.

Lubbock, J.  
McCurdy, J. F.  
McGee, W. J.  
McLennan, J. F.  
Mallery, G.  
Mantegazza, P.  
Mason, O. T.  
Mooney, J.  
Morgan, Jacques de  
Morgan, L. H.  
Mortillet, L. L.  
Pilling, J. C.  
Powell, J. W.  
Prichard, J. C.

Putnam, F. W.  
Quartrefages, J. L. A.  
Ranke, J.  
Ratzel, F.  
Reinach, S.  
Ripley, W. Z.  
Rivers, W. H. R.  
Schoolcraft, H. R.  
Sergi, G.  
Smith, Buckingham  
Squier, E. G.  
Topinard, P.  
Tylor, E. B.  
Ujfalvy, C. E.

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## Chapter 6. Religion

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**O**F THE numerous classifications of religion, none of which is free from many serious objections, we may adopt as the most practical that which divides creeds into monotheistic and non-monotheistic; and though here, too, we are confronted by the difficulty that certain faiths are neither one nor the other, completely, we may apply the former term to the three great religions of Judaism, Christianity, and Mohammedanism, and classify under the second heading all beliefs whatsoever, from primitive animism through the various national mythologies to the great moral and philosophic systems of the East. The starting point should be the comprehensive article on **RELIGION, COMPARATIVE**. The subject may be then pursued through such general articles as **BELIEF, WORSHIP, RITE, PRAYER, SACRIFICE, PRIEST**, etc. Additional titles, in great number, will naturally suggest themselves to the reader. The field, indeed, is extensive and touches intimately on the domains of Anthropology, Psychology, Philosophy, and History. This will be found especially true in the religions of the East, where philosophy and mythology or religion are practically one.

### A. Polytheistic Religions

1. The beginnings of religion, as studied in the beliefs of primitive races, will be found treated in the chapter on Anthropology, where appear such titles as

Man, Science of  
Nature-Worship  
Fetishism, etc.

The subject is carried on in the special articles dealing with individual tribes and nations, of which a list appears in the same chapter.

2. The religions and mythologies of the Babylonia, Assyria, Egypt, Greece, and Rome are discussed in the chapter on History, in the various sections devoted to those countries. The intimate connection of the religions and the political life in the ancient world has made this division seem desirable.

3. The mythology of the Scandinavian and Teutonic races differs from

that of Greece in its pervading atmosphere of gloom and the foreboding of fate. The northern divinities lack the joyous grace and humanity of the **Olympian** pantheon, and the powers of darkness, cold, and death play a far more conspicuous part. See:

Mythology  
Polytheism  
Scandinavian and Teutonic Mythology  
Edda  
Aesir  
Asgard  
Bifröst  
Yggdrasil  
Mimir  
Norns  
Odin  
Tyr  
Thor  
Bragi



Balder  
Loki  
Freyja and Frigga  
Ragnarök  
Fenrir  
Walhalla  
Hel  
Niflheim

4. We leave pure polytheism in passing to the great religions of India. It, there, evolves with time into complex systems of mythology modified by pantheism and agnosticism.

(a) BRAHMANISM.

Brahmanism may go back to the second millennium before the Christian era, and comprises the mass of beliefs and institutions originated or elaborated from a primitive nature-worship, by the Brahmans, who constitute the dominant class among the Hindus. It is essentially a legislative system, with a vast and minutely outlined ceremonial. In its later development, it is characterized by pantheism, the doctrine of Karma, and metempsychosis. See:

Brahmanism  
Aryan  
Veda  
Brahmana  
Upanishad  
Manu  
Brahma  
Varuna  
Agni  
Indra  
Ushas  
Maruts  
Pitris  
Sankhya  
Nyaya  
Vedānta

Mahabharata  
Rāmāyana  
Vishnu  
Śiva  
Krishna  
Purāṇa  
Tantra  
Vaishnavas  
Śaivas  
Śāktas  
Pārvati  
Kali  
Lakshmi  
Hanumān  
Ganesa  
Śraddha  
Caste  
Henotheism  
Karma  
Metempsychosis  
Theosophy  
Sikhs

(b) BUDDHISM.

Buddhism antedates Christianity in its origin, and its adherents are second in number only to those of the Christian faith. Taking its rise in Hindustan, it has spread over China, Indo-China, Japan, Tibet, and the plains of Northern and Central Asia. In that continent, its mission as a bearer of civilization and morality has been not unlike the rôle played by Christianity in Europe and America. See:

Buddhism  
Pitaka  
Asoka  
Metempsychosis  
Karma  
Nirvana  
Śravaka  
Shin-Shu  
Bonze

For a Variant of Buddhism, see

Lamaism

And, for an Allied Creed, see

Jainism

See also Brahmanism, above.

## 5. ZOROASTRIANISM.

In the great religion of Iran, we may find the earliest traces of primitive Aryan belief. Zoroastrianism is important for the influence it exercised on Judaism and Christianity, to which it contributed the great dualistic principle of the conflict between good and evil. See:

Zoroastrianism

Zoroaster

Avesta

Gâthâs

Pahlavi Language and Literature

Magi

Parsis

Ghebers

Ormazd

Ahriman

Mithras

Asmodeus

Saoshyant

6. The prevailing religion in China and Japan is Buddhism. The native religious systems of China are in reality moral philosophies. In Japan, however, we find a peculiarly national religion, influenced to some extent by Chinese and Buddhistic elements. See:

(a) Confucius

Mencius

Chu-Hi

(b) Taoism

Lao-tse

(c) Shintō

Kōbō Daishi

Fox-deity

Bushido

# B. Monotheistic Religions

## I. JUDAISM.

The history of the Jewish people, who claimed to be the nation specially favored of the One God, and the sole depository of His revelation, will be largely found in the historical chapter of this book; but here a few further indications may be given of some of their peculiar institutions. Their worship, in its earlier form, is described under TABERNACLE, then under TEMPLE, and in a special section of the article SACRIFICE, and a still later development is treated under SYNA-GOGUE.

Special observances at particular seasons are treated under:

.Passover

Purim

Atonement, Day of

Pentecost

Dedication Feast

Weeks, Feast of

Tabernacles, Feast of

Sabbath

Jubilee, Year of

On their sacred writings, besides the articles on each book of the Old Testament, see:

Talmud

Targum

Midrash

Gemara

Mishna

The functionaries of their religion and justice come under:

Priest  
 High Priest  
 Levite  
 Scribe  
 Rabbi  
 Sanhedrin

Other characteristic customs and usages:

Circumcision  
 Tithes  
 Unction  
 Proselyte  
 Urim and Thummim  
 Phylactery

The sects and parties which developed in course of time among the race are detailed under JEWISH SECTS, and specially in the following articles:

Pharisees  
 Sadducees  
 Essenes  
 Chasidim  
 Frank, Jacob

## II. CHRISTIANITY.

1. FOUNDATIONS. The history of Christianity is so diversified, and so intimately bound up with the development of European civilization, that a large amount of space is necessarily accorded to it. The most convenient division will begin with the foundations, including under that head the articles centring around its Founder and the history and worthies of the first few centuries of the Christian era, before Europe was submerged in the chaos which resulted from the barbarian invasions. See:

Christianity  
 Creeds and Confessions  
 Fundamentals of Christian Doctrine  
 Development of Doctrine

God  
 Jesus Christ  
 Incarnation  
 Hypostatic Union  
 Atonement  
 Intercession, Doctrine of  
 Resurrection  
 Miracles  
 Holy Ghost  
 Filioque  
 Trinity, Doctrine of the  
 Nicene Creed  
 Prayer  
 Providence  
 Predestination  
 Foreknowledge and Foreordination  
 Sin  
 Original Sin

Besides the article under the title ESCHATOLOGY, several others which follow deal with the problems which have so exercised the mind of man as to his ultimate destination after the short period of life in this world. See:

Immortality  
 Judgment, Final  
 Millennium  
 Second Advent of Christ  
 Apocalyptic Literature  
 Antichrist  
 Annihilationism  
 Heaven  
 Beatific Vision  
 Hell  
 Probation after Death  
 Purgatory  
 Limbus

The following articles deal with the organizations by whose means the religion of Christ was spread throughout the world, and with early records of its faith and practice:

Church

Council  
 Synod  
 Missions, Christian  
 Apostle  
 Doctors of the Church  
 Fathers of the Church  
 Persecutions of the Christians  
 Lapsed  
 Catechumens  
 Disciplina Arcani  
 Agapæ  
 Teaching of the Twelve Apostles  
 Apostolic Constitutions  
 Apostolic Fathers  
 Jerusalem, Councils of  
 Nicæa, Councils of  
 Constantinople, Councils of  
 Ephesus, Councils of  
 Council of Chalcedon (under Chalcedon)  
 For the great figures of the period of foundation and dissemination, see:  
 Mary  
 Joseph  
 John the Baptist  
 Peter  
 Paul  
 John  
 James  
 Philip  
 Bartholomew  
 Thomas  
 Andrew  
 Jude  
 Barnabas  
 Matthias  
 Mark  
 Luke  
 Mary Magdalene  
 Timothy  
 Titus  
 Stephen  
 Justin Martyr  
 Ignatius

Irenæus  
 Polycarp  
 Agnes  
 Agatha  
 Alban  
 Apollos  
 Athanasius  
 Arius  
 Augustine  
 Barbara  
 Basil  
 Boniface  
 Cassianus, Johannes  
 Cecilia  
 Chrysostom  
 Cyprianus  
 Cyril of Alexandria  
 Cyril of Jerusalem  
 Denis  
 Dionysius  
 Ephraem  
 Epiphanius  
 Eusebius  
 Felicitas  
 Fortunatus, Venantius  
 Gregory of Nazianzus  
 Gregory of Nyssa  
 Gregory Thaumaturgus  
 Gregory of Tours  
 Hilary  
 Hippolytus  
 Hosius  
 Isidore of Seville  
 Jerome  
 Lawrence  
 Martin of Tours  
 Patrick  
 Prudentius, Aurelius Clemens  
 Theodore of Mopsuestia

## 2. EARLY SECTS AND HERESIES.

No sooner had the Christian Church been fully organized and entered upon its mission of converting, than the infinite diversity of human minds im-

pelled different men to emphasize disproportionately some one aspect of the faith which all at first held in common. This was especially the case during the first three centuries, while Christianity had its chief stronghold in the East, the speculative and dialectical minds of whose people were naturally inclined to minute questions of abstract theology. The heresies which took their rise in the West were of a more practical kind, dealing, like Montanism, with the severity of discipline, or, like Pelagianism, with the freedom of the human will. Those who wish to trace the abstruse questions which threatened to divide the Church even before it had emerged from the shadow of persecution, may consult especially the following articles:

Adiaphorists

Adoptian Controversy

Arius

Aëtius

Agnoetæ

Alogians

Apollinaris

Celsus

Cerdonians

Cerinthus

Docetæ

Donatists

Dositheans

Ebionites

Elkesaites

Eutyches

Gnosticism

Hesychasts

Iconoclasm

Macedonians

Manichæism

Monarchians

Monophysites

Monothelitism

Montanus

Nestorians

Nicolaitans

Novatian

Origen

Patripassianism

Paulicians

Pelagianism

Sabellius

Semi-pelagianism

Valentinians

Vigilius

### 3. TRADITIONAL CHRISTIANITY.

The latter history of Christianity may be most conveniently divided into two main heads—according as the various Christian bodies have adhered, to a greater or less extent, to the older usages or beliefs, or have broken away from them, and evolved new ones of their own. Of these two divisions, the former is inevitably much the larger, covering a much greater extent of time and a wider range of subjects. The naturally unchanging East has been less affected by the currents of thought, and the many practical problems, which have introduced many changes or developments in the western world. The articles **PAPACY**, which traces the history of the central see of Christendom, down to the Council of Trent; **ROMAN CATHOLIC CHURCH**, which includes the subsequent history of the churches in communion with it; and **GALLICAN CHURCH**, give a large part of the general institutional development; and the biographies of nearly all the Popes, contain valuable indications of the policy which has at different periods guided the larger part of Christendom. The article, **CHURCH HISTORY**, contains an account of the principal

writers who have narrated this development; and the following articles contain detailed information on all the more important points.

(a) For Church Organization, see:

Patriarch  
Metropolitan  
Archbishop  
Bishop  
Titular Bishops  
Suffragan  
Apostolic Succession  
Orders, Holy  
Cardinal  
Conclave  
Legate  
Priest  
Rector  
Vicar  
Vicar-General  
Archdeacon  
Cathedral  
Dean  
Chapter  
Rural Dean  
Deacon  
Subdeacon  
Acolytes  
Reader  
Exorcist  
Ostiarius  
Tonsure  
Council  
Encyclical Letters  
Bull  
In Cœna Domini  
Unigenitus  
Brief, Papal  
Church Discipline  
Excommunication  
Dispensation  
Indulgence  
Inquisition

Congregation  
Propaganda  
Index  
Commandments of the Church  
Celibacy

(b) Christianity had scarcely been organized before a definite form of worship was adopted, and this became more and more fixed and uniform in its details as time went on. A great many matters of interest are contained in the history of these liturgical forms, which will be found fully given under numerous titles. See:

Worship  
Liturgy  
Mozarabic Liturgy  
Mass  
Requiem  
Introit  
Kyrie Eleison  
Gloria in Excelsis  
Collect  
Epistle  
Gradual  
Sequence  
Gospel  
Offertory  
Secret  
Missal  
Pontifical  
Ritual  
Processional  
Canonical Hours  
Breviary  
Lesson  
Te Deum  
Magnificat  
Nunc Dimittis  
Miserere  
De Profundis  
Ave Maria  
Angelus Domini

Hymnology  
 Dies Iræ  
 Pange Lingua  
 Tantum Ergo  
 Veni Creator Spiritus  
 Litany  
 Benediction  
 Rosary of the Blessed Virgin Mary  
 Tenebræ

(c) Under **COSTUME, ECCLESIASTICAL**, a full account will be found of the historical development of ecclesiastical vestments and their use at the present day in various parts of Christendom. A number of other articles also give details as to specific vestments and articles used in divine worship. See:

Tiara  
 Pallium  
 Mitre  
 Crosier  
 Stole  
 Maniple  
 Surplice  
 Flabellum  
 Altar  
 Tabernacle  
 Incense  
 Censer  
 Cross  
 Chalice  
 Corporal  
 Agnus Dei

(d) The Christian religion, at least in its ancient and traditional form, is essentially a sacramental one. In other words, it provides for the two-fold nature of man—body and soul—by using outward and visible signs to convey inward and spiritual grace. A large number of important subjects, accordingly, fall under the heading **Sacrament**. See:

Sacrament  
 Baptism  
 Clinic Baptism  
 Heretic Baptism  
 Sponsors  
 Confirmation  
 Lord's Supper  
 Transubstantiation  
 Viaticum  
 Penance  
 Confession  
 Absolution  
 Orders, Holy  
 Marriage  
 Extreme Unction  
 Sacramentals  
 Holy Water  
 Scapular  
 Jubilee  
 Pilgrim  
 Stations  
 Image-Worship  
 Foot-Washing

(e) Very early in the history of the Christian Church, special observances began to be connected with certain days—weekly, and annual commemorations of events in the life of its Founder, and anniversaries of the chief worthies who adorned its history. These are treated under:

Sunday  
 Friday  
 Festivals  
 Fast  
 Christmas  
 Epiphany  
 Candlemas  
 Annunciation  
 Ash-Wednesday  
 Lent  
 Holy Week  
 Maundy Thursday

Good Friday  
 Easter  
 Ascension Day  
 Pentecost  
 Trinity Sunday  
 Corpus Christi  
 Assumption of the Virgin Mary  
 All-Soul's Day  
 Ember-Days  
 Angel  
 Michael  
 Gabriel  
 Saint  
 Martyr  
 Canonization  
 Beatification  
 Advocatus Diaboli  
 Acta Sanctorum

(f) It is scarcely necessary to enumerate the separate books of the Bible, on which every organization of Christians professes to base its creed. Under each of their titles, the history and purport of every book may be studied, as well as the most approved conclusions of the most recent scientific criticism. Questions relating to the Bible as a whole are discussed at great length in the main article **BIBLE**; and reference may be made to the following subsidiary titles:

Inspiration  
 Revelation  
 Canon  
 Biblical Criticism  
 Bible Archæology  
 Textual Criticism  
 Tübingen School  
 Concordance  
 Apocrypha  
 Deuterocanonical Books  
 Bible Society  
 Bible, Curious Editions of

4. **THE MONASTIC LIFE.** As the civilized world, under the later Roman empire, grew more and more corrupt, the feeling gained ground that the surest way to escape from the wrath to come was to flee into the desert, and by prayer and mortification to avert the divine displeasure. The monastic life, therefore, considered as the most perfect carrying out of the counsels of Christ, took firm root in the Church. General details of its spirit and organization will be found under:

Monasticism  
 Asceticism  
 Vow  
 Monastery  
 Laura  
 Hermit  
 Recluse  
 Pillar Saint  
 Abbey  
 Abbot  
 Canon  
 Brothers, Lay  
 Brotherhoods, Religious  
 Tertiary  
 Monastic Art

The earlier monastic ideal was that of absolute separation from the world, considered as an inherently wicked place; and all the older orders, though frequently of the greatest service to society and civilization by their preservation of learning, and by their diligent labors in agriculture and the like, approach more or less the type known as cloistered orders. Of these the principal ones follow in chronological sequence, with their founders, where these have separate articles:

Antony



Paul  
 Basilian Monks  
 Augustinians  
 Benedictines  
 Benedict  
 Cluniacs  
 Camaldolites  
 Carthusians  
 Bruno  
 Chartreuse, La Grande  
 Charterhouse  
 Cistercians  
 Bernard  
 Premonstratensians  
 Gilbertines  
 Beguines  
 Carmelites  
 Servites  
 Celestines  
 Brigittines  
 Bridget  
 Ursulines  
 Angela Merici  
 Trappists  
 Rancé, Armand de

As modern society gradually became organized on more stable foundations, and men whose temperaments and habits were peaceful could be safe under its protection, another type came forward, whose fundamental idea was not retirement from the world, but an effort to sanctify it, by mingling more or less with it. Under the head of what may be called missionary communities, the following are to be noted:

Sisterhoods  
 Trinitarians  
 Franciscans  
 Francis of Assisi  
 Clares, Poor  
 Clare  
 Dominicans

Dominic  
 Minimites  
 Francis of Paola  
 Barnabites  
 Theatines  
 Capuchins  
 Jesuits  
 Ignatius of Loyola  
 Oratory, Congregation of the  
 Philip Neri  
 Oblates  
 Borromeo, Carlo  
 Piarists  
 Visitation, Sisters of the  
 Francis de Sales  
 Chantal, Jeanne Françoise  
 Lazarists  
 Vincent de Paul  
 Sulpicians  
 Olier, Jean Jacques  
 Brothers and Sisters of Charity  
 Brothers of the Christian Schools  
 La Salle, Jean Baptiste de  
 Passionists  
 Paul of the Cross  
 Redemptorists  
 Liguori, Alfonse Maria di  
 Sacred Heart, Ladies of the  
 Mercy, Fathers of  
 Paulists

5. MEDIEVAL PERIOD. The religious aspect of the Middle Ages will be found represented in nearly every article in the foregoing section; but certain others may be added which give an account of significant developments taking place within this period. Thus we have the formal organization of a whole logical system of dogmatic theology and philosophy (see SCHOLASTICISM), and of a parallel system of ethics or moral theology (see CASUISTRY). The story of the CRUSADES is of great importance, supplemented

under JERUSALEM by the history of the kingdom and patriarchate there established. The crucial controversies between Church and State which persisted throughout the Middle Ages are treated under INVESTITURE and REGALIA as well as under PAPACY. (See also in the chapter on history the section dealing with the Mediæval Ages.) Under SCHISM, WESTERN, we may follow the division within the Church caused by the pretensions of rival popes. The efforts made to secure unity of faith and discipline appear under:

- Lateran Councils
- Basel, Council of
- Ferrara-Florence, Council of
- Pisa, Council of
- Lyons, Councils of
- Inquisition
- Torquemada

The story of those who in this period broke away from that unity is told under:

- Cathari
- Fratricellians
- Albigenses
- Waldenses
- Brothers and Sisters of the Free Spirit
- Apostolic Brethren
- Lollard
- Abélard
- Berengarius of Tours
- Gottschalk
- Wiclif

Other topics of special mediæval interest are:

- Joan, Pope
- Feast of Fools
- Biblia Pauperum
- Pseudo-Isidorian Decretals

- Fulda, Monastery of
- Saint Gall
- Monte Cassino

The great names in the theology, philosophy, and mysticism of the Mediæval Ages include:

- Adalbert
- Ailly, Pierre d'
- Albert, Count of Bollstädt
- Alexander of Hales
- Anselm
- Aquinas, Thomas
- Becket, Thomas à
- Bede
- Bonaventura
- Catharine of Siena (under Catharine)
- Clémanges, Nicolas de
- Columba
- Damiani, Pietro
- Duns Scotus
- Dunstan
- Eadmer
- Erigena, Johannes Scotus
- Joachim of Floris
- Kempis, Thomas à
- Lanfranc
- Lully, Raymond
- Malachy
- Occam, William of
- Peter Lombard
- Peter the Hermit
- Rabanus Maurus
- Savonarola, Girolamo
- Tauler, Johann
- Teresa, St.
- Wadding, Luke
- William of Saint-Amour
- William of Wykeham

6. THE REFORMATION PERIOD. A special section may well be devoted to the period of unrest and disruption commonly known as the Reformation.

All over Europe there was a movement, more or less general and permanent according to local circumstances, towards throwing off the authority of the Pope, simplifying faith and worship, and returning to what were assumed to be primitive beliefs and usages. See:

Reformation  
Counter-Reformation  
Utraquists  
Communion in Both Kinds  
Brethren, Bohemian  
Augsburg Confession  
Interim  
Concord, Book of  
Corpus Doctrinæ  
Magdeburg Centuries  
Epistolæ Obscurorum Virorum  
Antinomianism  
Bartholomew's, Massacre of Saint  
Dort, Synod of  
Reformed Churches  
Trent, Council of

For the Men of this Period, see:

Albert (of Magdeburg)  
Baronius, Cæsar  
Bellarmine  
Beza, Théodore  
Bucer, Martin  
Bugenhagen, Johann  
Cajetan, Thomas  
Campion, Edmund  
Calvin, John  
Canisius, Petrus  
Cano, Melchior  
Carlstadt  
Colet, John  
Eck, Johann Maier von  
Erasmus, Desiderius  
Erastus, Thomas  
Faber, Jacques  
Fisher, John  
Hamilton, Patrick

Hooper, John  
Hutten, Ulrich von  
Luther, Martin  
Melancthon, Philip  
More, Thomas  
Œcolampadius, Johannes  
Philip the Magnanimous  
Reuchlin, Johann  
Sarpi, Paolo  
Tetzel, Johann  
Vermigli, Pietro Martire  
Wishart, George  
Zwingli, Ulrich

7. Before proceeding to a review of the Reformed Churches of modern times, the history of Eastern Christianity, separate from that of the Roman Catholic Church since 1054, may be studied under the following titles:

Greek Church  
Filioque  
Quinisext  
Photius  
Lucaris  
Nikon  
Raskolniki  
Dukhobortsy  
Molokani  
Skoptsy  
Stundists

#### 8. MODERN REFORMED CHURCHES.

(a) **ANGLICAN.** The article under the title, **ANGLICAN COMMUNION**, explains the extent and relations of the various churches in communion with the Church of England, which represent characteristically the more conservative elements in the religion of the English-speaking races. Though as organizations they owe their origin to the great upheaval of the sixteenth century, their doctrine and usages are

largely in harmony with those which prevailed before the Reformation, and will be found treated in many instances under titles which include the ancient and modern Roman Catholic belief or practice. The following articles, however, may be consulted for specifically Anglican points:

England, Church of  
Ireland, Church of  
Episcopal Church  
Articles, The Thirty-nine  
Prayer-Book  
Homily  
Lambeth Conference  
Church Congress  
Supremacy, Royal  
Ecclesiastical Commissioners  
Vestry  
Warden, Church  
Parish  
Parish Clerk  
Lay Reader  
Advertisements of Elizabeth  
Martin Marprelate Controversy  
Savoy Conference  
Nonjurors  
Nonconformists  
Dissenters  
Act of Uniformity  
Oxford Movement  
Gorham Controversy  
Ecclesiastical Titles Assumption  
Act  
Ritualism  
Queen Anne's Bounty  
Christian Knowledge, Society  
for Promoting  
Church Temperance Society  
Brotherhood of Saint Andrew  
Daughters of the King  
Bampton Lectures  
Hulsean Lectures

Among the prominent names in the history of the Church of England in Great Britain appear:

Cranmer, Thomas  
Ridley, Nicholas  
Latimer, Hugh  
Hooker, Richard  
Laud, William  
Andrewes, Lancelot  
Hall, Joseph  
Ken, Thomas  
Leighton, Robert  
Taylor, Jeremy  
Sanderson, R.  
Whitgift, J.  
Tillotson, John  
Wake, William  
Atterbury, Francis  
Warburton, William  
Simeon, Charles  
Romaine, W.  
Pusey, Edward Bouverie  
Keble, John  
Rose, Hugh James  
Forbes, Alexander P.  
Liddon, Henry Parry  
Maurice, Frederick Denison  
Arnold, Thomas  
Robertson, Frederick W.  
Milman, Henry Hart  
Jowett, Benjamin  
Stanley, Arthur Penrhyn  
Wilberforce, Samuel  
Trench, Richard Chenevix  
Vaughan, Charles J.  
Wordsworth, Charles  
Wordsworth, Christopher  
Benson, Edward White  
Lightfoot, Joseph Barber  
Westcott, Brooke Foss  
Thorold, Anthony Wilson  
Stubbs, William  
Bright, William

Tait, Archibald Campbell  
Temple, Frederick

Of the Church in America the leading representatives have been :

Seabury, Samuel  
White, William  
Hobart, John Henry  
Provoost, Samuel  
Hopkins, John Henry  
Muhlenberg, William Augustus  
Tyng, Stephen H.  
Whittingham, William Rollinson  
Williams, John  
Whipple, Henry B.  
Potter, Horatio  
Potter, Alonzo  
Potter, Henry Codman  
Brooks, Phillips  
Newton, Richard Heber  
Dix, Morgan

(b) PRESBYTERIAN :

Presbyterianism  
Elder  
Moderator  
Synod  
Westminster Assembly  
Perth, Five Articles of  
Cameronians  
Covenants, The  
Infralapsarian  
Alexander, Archibald  
Alexander, J. A.  
Babcock, M. D.  
Baird, C. W.  
Briggs, C. A.  
Burrell, D. J.  
Calamy, Edmund  
Cameron, J.  
Chalmers, Thomas  
Cuyler, T. L.  
Geddes, J.  
Green, W. H.

Hall, John  
Hodge, C.  
Knox, John  
Melville, Andrew  
Parkhurst, C. H.  
Patton, F. L.  
Paxton, J. R.  
Prentiss, G. L.  
Prime, S. I.  
Robinson, C. S.  
Shields, C. W.  
Talmage, T. DeWitt  
Tennent, Gilbert  
Watson, John  
Witherspoon, J.

(c) METHODIST :

Methodism  
Itinerancy  
Experience Meeting  
Camp-Meeting  
Epworth League  
Wesley, John  
Wesley, Charles  
Whitefield, George  
Coke, Thomas  
Huntingdon, Selima Hastings  
Asbury, Francis  
Clarke, Adam  
Emory, John  
Fowler, C. H.  
Haven, E. O.  
Haven, Gilbert  
Hurlbut, J. L.  
Hurst, John F.  
Moore, D. H.  
Moore, Henry  
Newman, J. P.  
Ouseley, G.  
Punshon, W. M.  
Sankey, Ira D.  
Strong, James  
Taylor, W.  
Tefft, B. F.

Townley, James  
 Townsend, L. T.  
 Vincent, J. H.  
 Walden, J. M.  
 Warren, H. W.  
 Watson, R.  
 Wise, Daniel

(d) CONGREGATIONALIST:

Congregationalism  
 Puritans  
 Separatists  
 Browne, Robert  
 Robinson, John  
 Cotton, John  
 Mather, Richard  
 Hooker, Thomas  
 Edwards, Jonathan  
 Hopkins, Samuel  
 Bellamy, Joseph  
 Dwight, Timothy  
 Abbott, Lyman  
 Bartlett, S. C.  
 Beecher, Henry Ward  
 Beecher, Lyman  
 Bissel, E. C.  
 Bushnell, H.  
 Dexter, H. M.  
 Finney, C. G.  
 Gladden, W.  
 Park, E. A.  
 Parker, Joseph  
 Phelps, Austin  
 Storrs, R. S.  
 Taylor, N. W.

(e) BAPTIST:

Baptists  
 Baptism  
 Baptism, Infant  
 Anabaptists  
 Münzer, T.  
 John of Leyden  
 Mennonites  
 River Brethren

Burrage, H. S.  
 Conant, T. J.  
 Hall, R.  
 Lorimer, G. C.  
 Peters, M. C.  
 Ripley, H. J.  
 Robinson, E. G.  
 Spurgeon, C. H.  
 Vedder, H. C.  
 Wayland, F.

(f) LUTHERAN:

Lutheranism  
 Reformation, The Protestant  
 Luther  
 Melancthon  
 Augsburg Confession  
 Greenwald, Emanuel  
 Muhlenberg, H. M.  
 Muhlenberg, J. P. G.  
 Seiss, J. A.  
 Stuckenberg, J. H. W.

(g) DUTCH REFORMED:

Reformed Church in America  
 Belgic Confession  
 Heidelberg Catechism (under  
 Catechism)  
 Dort, Synod of  
 Classis  
 Ferris, I.  
 Riddle, M. B.

(h) QUAKER OR FRIENDS:

Friends  
 Fox, George  
 Penn, William  
 Hicks, Elias  
 Gurney, J. J.  
 Wilbur, John

(i) UNITARIAN:

Unitarianism  
 Arius  
 Socinus  
 Servetus, Michael

Biddle, John  
 Priestley, Joseph  
 Allen, J. H.  
 Chadwick, J. W.  
 Channing, W. E.  
 Collyer, Robert  
 Freeman, James  
 Frothingham, O. B.  
 Hill, Thomas  
 Parker, Theodore  
 Savage, M. J.  
 Ware, Henry

- (j) UNIVERSALIST:  
 Universalism  
 Rely, James  
 Murray, John  
 Ballou, Hosea  
 Hanaford, Phebe A.

- (k) MORMON:  
 Mormons  
 Smith, Joseph  
 Pratt, Orson  
 Rigdon, S  
 Taylor, John  
 Woodruff, W.  
 Young, Brigham

- (l) OTHER DENOMINATIONS:  
 Adventists  
 Miller, William  
 Christian Catholic Church  
 Christians  
 Christian Science  
 Disciples of Christ  
 Eddy, Mary Baker Glover  
 Evangelical Alliance  
 German Baptist Brethren  
 German Evangelical Protestant  
 Church  
 German Evangelical Synod of  
 North America  
 Institutional Church  
 Moravians  
 Brethren, Bohemian

Huss, John  
 Comenius, J. A.  
 Zinzendorf, Nikolaus  
 Reformed Church in the Unit-  
 ed States.  
 United Brethren in Christ  
 Otterbein, P. W.  
 Evangelical Association

### III. MOHAMMEDANISM.

The history of Islam is closely connected with the history of the nations which adopted it as their creed. Though the spread of Mohammedanism has at all times been to some extent due to missionary zeal, its extension has largely been coincident with conquests. The political aspect of Moslem history may be best studied under the names of Mohammedan nations, dynasties, and rulers, such as ABBASIDES, OMMIADS, SELJUKS, TURKEY, ARABIA, etc. Here are only given the leading titles dealing with the religious development and present character of the faith.

For the Rise of Islam, see:

Mohammed  
 Mohammedanism  
 Mohammedan Sects  
 Islam  
 Mecca  
 Medina  
 Hejira  
 Ayeshah

For the successors of Mohammed and early conquerors who spread the gospel of Islam in Asia, Africa, and Europe, see:

Caliph  
 Abu-Bekr  
 Omar.

Othman  
 Ali  
 Omniads  
 Khalid  
 Musa ibn Nusair  
 Amr ibn al-Asi  
 Tarik  
 Idrisites  
 Aghlabids  
 Fatimites  
 Almoravides  
 Almohades

For the tenets and practices of the faith, in addition to the titles already quoted, see:

Koran  
 Sunna  
 Hadith  
 Kaaba  
 Hajj  
 Hajji  
 Fast  
 Ramadan  
 Beiram  
 Muharram  
 Kiblah  
 Houri  
 Jinn  
 Iblis

Imam  
 Mufti  
 Muezzin  
 Ulema  
 Madrasah  
 Marabouts  
 Mosque

For Sects and Parties, see:

Sunnites  
 Shiites  
 Hasan and Husain  
 Mahdi  
 Nosairians  
 Assassins  
 Druses  
 Hakim ibn Allah  
 Mutazilites  
 Sincere Brethren  
 Wahabis  
 Dervish  
 Babism  
 Sufism  
 Senussi

For Mohammedan Theologians:

Abu Hanifah  
 Ibn Hanbal  
 Ibn Tumart  
 Ghazali



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## Chapter 7. Education

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**T**HE study of the science of education is peculiarly related to the study of the growth and development of the intellectual, moral, and spiritual life of the human race. Every department of knowledge is necessarily in some way connected with the science of education. Most of the great thinkers of all ages have contributed to the literature of the science, and consequently many names must be included in our list of educators which appear, as well, in some other field. As part of some one philosophical system or another, education goes back to early times, but its history as an independent science, separated from philosophy or theology, is quite recent. Its problems, too, have grown immeasurably more complex with the progress of democratic ideals and the widening of its sphere of interest. More even than national defense, the fostering of public education has come to be the great function of the modern State; and, though differences of opinion prevail as to how far this obligation extends in practice, in all progressive countries there is no class of men whom the government, in one way or another, does not attempt to supply with the means of education.

There are three sides from which students may approach the study of the science: the historical, the psychological, and the pedagogical.

The History of education is outlined in the Article EDUCATION, which traces its development from the dawn of civilization to the present day. A more detailed study of the subject may be systematically pursued in the following lists of articles. The subject is usually divided into four periods: Pre-Christian (including the Oriental and the Classical types), Early Christian, Mediæval, and Modern.

### I. THE PRE-CHRISTIAN PERIOD.

(a) The several types of Oriental education are discussed in the following articles:

Confucius  
Buddhism  
Caste  
Jews  
Talmud  
Rabbi  
Mohammedanism  
Ulema  
Mufti  
Madrasah

they strove to attain their ideals, are discussed under the following heads:

Sophists  
Socrates  
Plato  
Aristotle  
Xenophon  
Cyropædia  
Sparta  
Games  
Plutarch  
Quintilian

### II. THE EARLY CHRISTIAN PERIOD.

(b) The aims of Greek and Roman educators, and the methods by which

The part played by the early Christian Fathers in the furtherance of education and the establishment of schools will be found under:

Catechumens

Catechetical Schools

Chrysostom

Basil the Great

Clement of Alexandria

Origen

Theodore of Mopsuestia

For the struggle between the pagan and early Christian educators, see:

Tertullian

Augustine

These bring the student up to the Mediæval period.

### III. THE MEDIÆVAL PERIOD.

In the series of articles dealing with this period, the student will find an account of the efforts made by the Church to promulgate education throughout Christendom, and will be led up to the modern movement, which properly co-extends with the movement that led up to and through the Reformation. See:

Monasticism

Benedictines

Arts, Liberal

Quadrivium

Trivium

Scholasticism

Charles the Great

Alcuin

Alfred the Great

Abélard

Chivalry

University

### IV. THE MODERN PERIOD.

Educational progress was hastened and turned into varying channels by the revival of the old learning. The Reformation initiated the separation of education from theology, and, by breaking up the unit of European culture, gave rise to national systems of

education and the use of the national vernaculars as the medium of instruction. For the early educational reformers, see:

Renaissance

Humanism

Dante

Petrarch

Boccaccio

Poggio Bracciolini

Pico della Mirandola

Poliziano

Reuchlin

Erasmus

Budæus

Scaliger, J. J.

Scaliger, J. C.

Casaubon, I.

Hardouin, J.

Reformation, The Protestant

Luther

Melanchthon

Sturm, Johannes

Ascham, Roger

Rabelais

Montaigne

Bacon, Francis

Induction

Ratichius

Comenius

Orbis Pictus

The efforts of the Catholic Church to counteract the effects of the Reformation may be studied in the following articles:

Ignatius of Loyola

Jesuits

Ratio Studiorum

Jansenism

Port-Royal-des-Champs

For the activity of the Church in supplying education to the very young, see:

La Salle, Jean Baptiste de  
Brothers of the Christian Schools

For writers who contributed to the advancement of the science of education, see:

Milton, John  
Locke, John  
Fénelon, François

The realistic movement in education begins with FRANCKE, and the Real-schule had its inception in his efforts. The movement culminates in the thorough sweeping away of old methods and ideas in education, foreshadowed in Rousseau's protest in his *Emile*. See:

Francke, A. H.  
Rousseau  
Emile  
Basedow  
Pestalozzi  
Girard, J. B.  
Jacotot  
Fröbel  
Kindergarten  
Herbart  
Mann, Horace  
Spencer, Herbert  
Arnold, Thomas  
Bell, Andrew  
Lancaster, Joseph

The systems of education prevalent in Europe and America are treated with great minuteness in the article on NATIONAL EDUCATION, SYSTEMS OF. The subject is further amplified in the sections on Education of the articles on the various countries of the world, wherein the statistical side is emphasized. The various phases of State activity receive full attention in the following articles:

Schools

Public Schools  
Evening Schools  
Secondary Schools  
High Schools  
Grammar Schools  
Gymnasias  
Realschule  
Women, Education of  
Negro Education  
Industrial Schools  
Vacation School  
Education, Colonial

#### V. PEDAGOGY.

Pedagogy is that branch of the science of education which deals with the methods and means of carrying out educational ideas. The old and the new educational methods receive comprehensive treatment in the article PEDAGOGY, which is amply supplemented by the following articles:

Nature-Study  
Child Psychology  
Object Teaching  
Curriculum  
Kindergarten  
Physical Education  
Manual Training  
Normal School  
Education, Commercial  
Technical Education  
Professional Education  
Theological Education  
Medical Education  
Legal Education  
Agricultural Education  
Seminar  
Privat-Dozent  
Reading  
Spelling

#### VI. EDUCATIONAL INSTITUTIONS.

The growth of colleges and universities in Europe and America is treated from the general standpoint in the

article on **UNIVERSITY**. This is supplemented by separate accounts of all of the important colleges and universities in the world. The list of American colleges and universities is especially complete; to such an extent, indeed, that mention may be made of only a few of the most prominent.

See:

- University
- College
- Colleges, American
- Carnegie Foundation
- General Education Board
- Curriculum
- Elective Courses
- Degree
- Diploma
- Examination
- Fellowship
- University Extension
- Harvard University
- Yale University
- Princeton University
- Columbia University
- Pennsylvania, University of
- Brown University
- Cornell University
- Johns Hopkins University
- Clark University
- Chicago University
- Leland Stanford Junior University
- Catholic University of America
- Amherst College
- Bowdoin College
- Dartmouth College
- William and Mary College
- Williams College
- Girard College
- Carnegie Institution

The State universities have all been written up in detail.

For a group of women's colleges in the United States, see:

- Barnard College
- Bryn Mawr College
- Goucher College
- Mount Holyoke College
- Radcliffe College
- Smith College
- Vassar College
- Wellesley College

In this connection see also:

- Collegiate Education of Women
- Coeducation

For English universities and schools, see:

- Oxford University
- Rhodes Scholarships
- Cambridge, University of
- London University
- Liverpool, University of
- Manchester, University of
- National University of Ireland
- Dublin University
- Girton College
- Newnham College
- Eton College
- Rugby School
- Harrow School
- Shrewsbury School
- Winchester College

For the greatest of European universities, either in present importance or historically, see:

- Paris, University of
- Berlin, University of
- Vienna, University of
- Madrid, University of
- Munich, University of
- Moscow, University of
- Leipzig, University of
- Edinburgh, University of
- Heidelberg, University of
- Bologna, University of
- Padua, University of

Salerno, School of  
Coimbra, University of  
Salamanca, University of  
Montpellier, University of  
Prague, University of

A partial list of prominent educators of the modern times includes:

Adams, C. K.  
Ames, J. B.  
Andrews, E. B.  
Angell, J. B.  
Arnold, T.  
Barnard, F. A. P.  
Barnard, Henry  
Bascom, J.  
Brown, E. E.  
Butler, N. M.  
Clayton, P. P.  
De Garmo, C.  
Dewey, John  
Drisler, Henry  
Eliot, C. W.  
Gildersleeve, B. L.  
Gilman, D. C.  
Hadley, A. T.  
Hadley, James  
Hall, G. S.  
Hanus, P. H.  
Harkness, A.  
Harper, W. R.  
Harris, W. T.  
Hill, D. J.  
James, E. J.  
James, W.

Jebb, Sir R. C.  
Jordan, D. S.  
Jowett, B.  
Low, Seth  
Lyon, Mary  
McCosh, J.  
McMurry, F. M.  
Monroe, Paul  
Pattison, Mark  
Patton, F. L.  
Quick, R. H.  
Sadler, M. E.  
Schurman, J. G.  
Sidgwick, Mrs.  
Washington, Booker T.  
Wendell, Barrett  
West, Wm. A.  
Wheeler, B. I.  
White, A. D.  
Whitney, W. D.  
Wirt, Wm. A.  
Young, Ella Flagg

For classes of institutions that have become centres for the spread of popular education, see:

(a) Libraries:

New York Public Library  
Book  
Alexandrian Library  
Bodleian Library  
British Museum  
Bibliothèque Nationale  
Library of Congress

(b) Museum

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## 8. Philosophy and Psychology

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**T**HOUGH great diversity exists as to the meaning and scope of the term Philosophy, two definitions may be given as representative. The more modern view regards philosophy as the sum of all scientific knowledge, or the systematization of results obtained in the individual sciences; the historical and more prevalent view looks upon philosophy as the search for the ultimate nature and meaning of the universe, and especially of human life. Embracing at one time the totality of scientific knowledge, the field of philosophy has steadily grown narrower with the erection of independent sciences, until at the present day it includes the studies of metaphysics, logic, ethics, and æsthetics. Psychology is the latest branch of investigation to achieve its emancipation from philosophy, whose methods, historically, have been quite different from those that prevail in the scientific world to-day.

I. 1. The problems of philosophy are best studied, perhaps, historically. A brief summary, however, in necessarily technical language, will serve to present the main outlines of the subject in the form in which they have appeared to thinkers of different ages. Generally, then, the problems of philosophy are divided into three classes: those which deal with the ultimate nature of the universe, grouped under the heading **METAPHYSICS**; those which deal with the forms of human knowledge and its relation to reality, known as epistemology, or the theory of knowledge; and those dealing with human conduct, included in the science of ethics. See:

Philosophy  
Metaphysics  
Knowledge, Theory of  
Ethics

2. The inquiry into the nature of reality takes on two forms: that concerned with the ultimate nature of things, and that dealing with the connection between things, or the architectural plan of the universe.

(a) For the First, see:

Ontology  
Dualism  
Monism  
Materialism  
Mechanism  
Realism  
Idealism

(b) For the Second, see:

Atomism  
Theism  
Transcendentalism  
Pantheism  
Body and Mind  
Parallelism  
Substance  
Form  
Causality  
Time  
Space  
Teleology  
Infinite  
Absolute

3. In connection with our knowledge of the universe, two questions arise: (a) Taking the conglomeration of ideas we call knowledge, is there an outside Reality corresponding to them,

or are they Reality itself; and (b) are these ideas in origin the result of experience, or are they independent of experience? See:

- (a) Realism
  - Idealism
  - Skepticism
- (b) Empiricism
  - Rationalism
  - A priori
  - Dialectic
  - Category
  - Induction
  - Deduction

II. 1. The history of European philosophy begins with the Greeks, in whom, however, strong Oriental influences are traceable. Their earliest philosophy was a nature philosophy, and its two great problems were those of Being and Becoming. See:

Greek Philosophy  
 Thales  
 Anaximander  
 Anaximenes  
 Eleatic School  
 Xenophanes  
 Parmenides  
 Zeno (the Eleatic)  
 Gorgias  
 Heraclitus  
 Pythagoras  
 Pythagoreanism  
 Neo-Pythagoreanism  
 Archytas  
 Metempsychosis  
 Empedocles  
 Anaxagoras  
 Atomism  
 Leucippus  
 Democritus

2. In the second period, the main interest of philosophy becomes anthro-

pological or ethical, the tendency being most fully apparent in the figure of the great teacher Socrates, from whom descend the great schools of the Hellenistic world, Platonists, Stoics, Hedonists, Cynics. Plato and Aristotle by their genius moulded almost the channels in which philosophic thought was to flow in the future. Greek philosophy, toward its end, exerted a powerful influence on Christianity. See:

Sophists  
 Protagoras  
 Socrates  
 Hedonism  
 Cyrenaic School  
 Aristippus  
 Hegesias  
 Epicurus  
 Epicureanism  
 Lucretius  
 Stoics  
 Zeno (the Stoic)  
 Cleanthes  
 Chrysippus  
 Seneca  
 Epictetus  
 Aurelius, Marcus  
 Cynics  
 Antisthenes  
 Diogenes  
 Euclid (of Megara)  
 Plato  
 Academy  
 Arcesilaus  
 New Academy  
 Carneades  
 Aristotle  
 Peripatetic Philosophy  
 Pyrrho  
 Ænesidemus  
 Sextus Empiricus  
 Skepticism

Neo-Platonism

Philo Judæus

Ammonius

Plotinus

Porphyrius

Iamblichus

Proclus

Boëthius

Anima Mundi

Logos

Eclecticism

Cicero

3. From the Platonic philosophy, as contained in the writings of the Christian Fathers, mediæval philosophy developed into the system known as Scholasticism, which in its fullest development, however, became Aristotelian, through the influence of the Arabian philosophers. Philosophy became the handmaiden of theology, and it supported the mysteries of the Christian faith by means of a subtle dialectic. The downfall of scholasticism began with the fourteenth century, and was hastened by the Revival of Learning. See:

Scholasticism

Augustine (of Hippo)

Erigena

Rabanus Maurus

Peter Lombard

Realism

Anselm of Canterbury

Guillaume de Champeaux

Nominalism

Roscelinus

Durandus

Occam, William of

Buridan, Jean

Ailly, Pierre d'

Concept

Abélard

Averroës

Avicenna

Albert of Bollstädt

Alexander of Hales

Vincent of Beauvais

Aquinas, Thomas

Duns Scotus

Suárez, Francisco

Mysticism

Hugo of St. Victor

Bernard of Clairvaux

Bonaventura, St.

Eckhardt

Tauler

Kempis

Böhme

Quietism

Molinos

Bacon, Roger

Lully, Raymond

Cusa, Nikolas

Renaissance

The Revival of Learning brought about a temporary revival of the classic philosophies, but these served only to bridge over the chasm between the ancient thought and the modern philosophy, whose beginning dates from the establishment of Empiricism by Bacon and Rationalism by Descartes. The subjects of Substance and Causality now assume leading importance. Cartesian rationalism ends in dogmatism on the Continent; empiricism ends in skepticism in England. See:

Bruno, Giordano

Campanella, T.

Gassendi

Rationalism

Descartes

Malebranche

Occasionalism

Spinoza

Pantheism

Leibnitz



Preestablished Harmony

Monad

Wolff, Christian

Baumgarten, A. G.

Eberhard, J. A.

Mendelssohn, Moses

Vico, G. B.

Empiricism

Hobbes, Thomas

Locke, John

Sensationalism

Clarke, Samuel

Butler, Joseph

Paley, William

Berkeley, George

Cambridge Platonists

Cudworth, Ralph

More, Henry

Hume, David

Charron, Pierre

Toland, John

Hartley, David

Priestley, Joseph

Condillac

La Mettrie

Diderot

D'Alembert

Helvétius

Holbach

Cabanis, J. P. G.

Genovesi, A.

Enlightenment, Philosophy of the  
Common Sense, Philosophy of

Reid, Thomas

Beattie, James

Stewart, Dugald

Hamilton, William

The critical philosophy of Kant sought to mediate between Rationalism and Empiricism by assigning to either its proper function in the mental life; and, though Kantianism was followed by the rise of great rationalistic systems in Germany, in which the

balance was overthrown anew, the teachings of the Königsberg philosopher have shown the greater vitality as being in consonance with the spirit of the growing sciences. Reaction against unrestrained idealism led to Positivism, in which philosophy becomes a correlation of sciences. Materialism, after a brief popularity, seems to have passed away forever. See:

Kant

Herder

Jacobi, F. H.

Hamann, J. G.

Krause, K. C. F.

Reinhold, C. E.

Rosenkranz, K.

Erdmann, J. E.

Trendelenburg

Zeller, E.

Ulrich, H.

Fischer, Kuno

For the important systems that arose after Kant, see:

Fichte, J. G.

Fichte, I. H.

Schelling

Hegel

Feuerbach, L. A.

Green, T. H.

And for a philosophy of will that has exercised a profound influence on modern thought:

Schopenhauer

Pessimism

Hartmann, Karl Robert

Materialism was fostered by the doctrine of evolution and the Darwinian discoveries. See:

Moleschott, J.

Büchner, F. L.

Vogt, Karl

Haeckel, E.

For the neo-Kantianism of the latest scientific thought, see:

Lange, F. A.  
Cohen, Herman  
Du Bois-Reymond, E. H.  
Helmholtz  
Virchow  
Wundt  
Renan  
Taine

For systematic attempts at reconciling philosophy and religion, see:

Schleiermacher  
Ritter, Heinrich  
Rosmini-Serbati  
James, Wm.

For philosophies that have been made the basis of important pedagogical psychologies, see:

Herbart  
Flügel, O.  
Benke  
Lotze  
Fechner  
Paulsen, Friedrich

Spiritualism had influential exponents in France in the beginning of the nineteenth century. See:

Royer-Collard  
Cousin, Victor  
Maine de Brian  
Jouffroy, T. S.  
Psychical Research  
Myers, F. W. H.

Spiritualism found its reaction in the epoch-making work of Comte. See:

Positivism  
Agnosticism  
Comte  
Littré  
Mill, J. S.

Spencer, Herbert  
Lewes, G. H.  
Harrison, Frederic  
Richl, A.

For philosophic thought in America, see:

Edwards, Jonathan  
Transcendentalism  
Emerson, R. W.  
Ripley, G.  
Alcott, A. B.  
Channing, W. E.  
Thoreau, H.  
McCosh, J.  
Harris, W. T.  
Royce, J.  
James, Wm.  
Ladd, G. T.  
Dewey, J.

Every well-rounded philosophical system has its logic, ethics, and æsthetics, and strictly speaking these cannot be divorced from the discussions of purely metaphysical problems. Nevertheless, as important subdivisions of philosophy, they have received an amount of attention that give them independent consideration.

A. The problems of human conduct are discussed minutely in the general article on ETHICS, and further differentiated in subsidiary articles. See:

Ethics  
Will  
Free Will  
Casuistry  
Chance  
Fatalism  
Determinism  
Indifferentism  
Egoism  
Altruism  
Energism

Eudæmonism  
 Intuitionism  
 Categorical Imperative  
 Utilitarianism  
 Hutcheson  
 Bentham, J.  
 Austin, J.  
 Mill, J. S.  
 Nietzsche, F.  
 Stephen, Leslie  
 Sidgwick, H.  
 Martineau, J.  
 Green, T. H.  
 Caird, E.  
 Alexander, Samuel  
 Fouillée  
 Simmel, G.

B. The formal rules of thought as outlined by Aristotle have received modifications at the hands of both rationalists and empiricists, the influence of the latter being, however, the more pronounced on the development of the science. See:

Logic  
 Knowledge, Theory of  
 Induction  
 Deduction  
 Argument  
 Syllogism  
 Analysis  
 Synthesis  
 Abstraction  
 Hypothesis  
 Judgment  
 Definition  
 Division  
 Percept  
 Concept  
 Connotation  
 Denotation  
 Obversion  
 Opposition  
 Comparison

Analogy  
 Identity, Law of  
 Fallacy  
 Dilemma  
 Mill J. S.  
 Jevons  
 Whately, R.

C. The separate science of æsthetics dates only from the eighteenth century. Its latest development has been along experimental and anthropological lines. See:

Æsthetics  
 Æsthetics, Experimental  
 Baumgarten, A. G.  
 Lessing, G. E.  
 Shaftesbury, third Earl of  
 Hogarth  
 Bain  
 Bosanquet  
 Santayana, George

D. The psychology of the present differs from earlier investigations of the human mind in its application of a more rigorous scientific method. It assumes no metaphysical substratum for mental life, but is content to take experience as its ultimate fact and to study its forms and manifestations. Though the science is to be dated only from the latter half of the nineteenth century, it has already been found necessary to divide the field of investigation for the purpose of the more effective study of the mind of the adult, the child, and the abnormal individual, and the collective mind of the crowd. The method of psychology is ultimately introspective, but it is introspection carefully pursued and corrected by the standard of the scientific average. For classification and methods, see:

Psychology

Individual Psychology  
 Genetic Psychology  
 Child Psychology  
 Social Psychology  
 Folk-Psychology  
 Insanity  
 Psychology, Experimental  
 Psychological Apparatus  
 Psychophysics  
 Introspection  
 Phrenology

Intensity of Sensation  
 Extension  
 Duration  
 Quality  
 Discrimination, Sensible  
 Contrast  
 Reaction  
 Weber's Law  
 Limen  
 Relativity, Law of

(c) For a Classification of Sensations,  
see:

Vision  
 Visual Sensation  
 Blind Spot  
 After-images  
 Illusion  
 Mirage  
 Hallucination  
 Clairvoyance  
 Apparition  
 Color  
 Saturation  
 Color-Blindness  
 Audition  
 Clang-Tint  
 Colored Hearing  
 Fusion  
 Smell  
 Taste  
 Touch  
 Cutaneous Sensations  
 Static Sense  
 Muscle Sense  
 Muscle-Reading  
 Pain  
 Fatigue  
 Common Sensation  
 Organic Sensations

With mental experience as basis for analysis, psychology finds that the analytical element of mental life is sensation, and sensations depend on bodily processes set in motion by external stimuli. Sensations are classified according to the organs whose stimulation they accompany. For mind in general, and its relation to body, see:

(a) Mind

Elements, Conscious  
 Mental Process  
 Self  
 Self-Consciousness  
 Unity of Consciousness  
 Double Consciousness  
 Sleep  
 Dreaming  
 Hypnotism  
 Autosuggestion  
 Somnambulism  
 Consciousness  
 Noetic Consciousness  
 Meaning  
 Body and Mind  
 Subconsciousness  
 Subliminal Consciousness  
 Cerebration, Unconscious

(b) For Sensation, see:

Sensation  
 Sensorium

From simple sensations the higher intellectual processes (perception, idea, association of ideas, etc.) are synthesized. A corresponding process has

been brought forward as the analytical element of our emotional life, and has been denominated Affection. From a combination of sensational and affective elements arise the various processes classified under the general designation, Will. It is thus that the new psychology improves upon the threefold division of Intellect, Reason, and Will in the older psychology. See:

Affection  
Conation  
Attention  
Effort  
Interest  
Tendency  
Disposition  
Faculty  
Mental Constitution

(a) For the Complex Sensational Processes:

Perception  
Idea  
Movement, Perception of  
Locality, Perception of  
Distance, Perception of  
Figure  
Rhythm  
Melody  
Association of Ideas  
Retention  
Reproduction of Ideas  
Memory  
Apperception  
Recognition  
Familiarity  
Apprehension  
Imagination  
Judgment  
Ratiocination  
Understanding  
Abstraction

Intellect

(b) For the Affective or Emotional Processes:

Feeling  
Emotion  
Mood  
Temperament  
Mental Constitution  
Sentiment  
Sympathy  
Antipathy  
Fear  
Anger  
Belief  
Expectation  
Expression  
Laughter  
Language  
Gesture

(c) For the Will Processes:

Will  
Action  
Instinct  
Impulse  
Desire  
Habit  
Practice

In the field of experimental investigation, Germany holds the first rank. Excellent work has been done in France, especially in the field of abnormal psychology, and in England and America, where German thought has blended with the native empiricism. See:

- (a) Weber, E. H.  
Fechner, G. T.  
Helmholtz, H.  
Hering, E.  
Flehsig, P. E.  
Stumpf, K.  
Müller, G. E.

- Wundt, W.  
(b) Bain, Alexander  
Romanes, G. J.  
Galton, F.  
Stout, G. F.  
Sully, James  
(c) Binet, A.  
Charcot, J. M.

- Ribot, T. A.  
(d) James, William  
Ladd, G. T.  
Münsterberg, H.  
Dewey, John  
Titchener, E. B.  
Baldwin, J. M.  
Hall, G. S.

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## Chapter 9. Language and Literature

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**T**HE tracing of the mutual relations of the various languages of the world, and the study of their similarities and differences, is the task of the science of comparative philology. The phonetic, or mechanical side, the inflectional, or constructive, and the syntactic, or psychological aspect, are the three factors which combine to form human speech. See:

### A. Language

#### 1. PHILOLOGY.

Philology  
Grammar  
Dialect  
Phonetics  
Accent  
Phonetic Law  
Grimm's Law  
Verner's Law  
Etymology  
Grassman's Law  
Inflection  
Declension  
Comparison  
Nouns  
Name  
Gender  
Adjective  
Pronoun  
Article  
Adverb  
Preposition  
Conjunction  
Interjection  
Verb  
Participle  
Conjugation  
Reduplication  
Ablaut  
Umlaut  
Syntax, Figures of  
Sentence  
Semasiology

Slang  
Metaphor  
Orthography, Figures of  
Prosody  
Rhyme  
Assonance  
Alphabet  
Inscriptions  
Paleography  
Runes  
Spelling  
Rhetoric  
Pronunciation  
Phonetics

2. For a classification of languages in related groups, see:

(a) *For the Monosyllabic Type:*  
Chinese Language

(b) *For the Agglutinative Type:*  
African Languages  
Egyptian (under Egypt)  
Coptic (under Copts)  
Ural-Altaic  
Finnish Language  
Turkish Language  
Japanese Language  
Dravidians  
Tamils  
Telugus  
Philippine Languages

(c) *For the Polysynthetic Type (Incorporating)*:

American Indian (under Indians, American):

(d) *For the Inflectional Type*:

Seimitic Languages

Cuneiform Inscriptions

Aramaic

Syriac Language

Samaritan Language

Moabitish Language (under Moabite Stone)

Arabic Language

Inflectional also are:

(i) Indo-Germanic Languages

(ii) The Languages of India:

Sanskrit

Pali

Prākṛit

Assamese (under Assam)

Bengali

Ceylonese (under Ceylon)

Gujarāṭi

Hindustani

Kashmiri

Maldiv

Marathi

Panjabi

Sindhi

Uriya

(iii) The Iranian Languages:

Iranian Languages

Old Persian

Avesta

Pahlavi

Persian

Afghan

Baluchi

Kurdish

Ossetic

(iv) Armenian

(v) Albanian

(vi) Mediterranean Languages:

Greek

Italic Languages

Latin

Italian

Spanish

Norman French

French

Provençal

Rumanian

Portuguese

(vii) The Teutonic Languages:

Teutonic Languages

Gothic

Icelandic

Norwegian

Swedish

Dutch

German

Plattdeutsch

Frisian

Flemish

Anglo-Saxon

English

Americanisms

(viii) The Celtic Languages:

Celtic Languages

Cornish

(ix) The Balto-Slavic Languages:

Old Prussian

Lettic

Lithuanian

(x) The Slavic Languages:

Slavic Languages

Old Church Slavic

Polish

Russian

Czech or Bohemian Language

See also:

International Languages

Esperanto

Volapük



3. For the great names in the field of comparative philology, see:

Ascoli, G. I.  
Bopp, F.  
Brugmann, F. K.  
Breal, M.  
Bugge, S.  
Burnouf, E.  
Grimm, J. L. K.  
Grundtvig, S. H.  
Kölbing, E.  
March, F. A.  
Menéndez Pidal, R.  
Meillet, A.  
Paris, G.  
Pott, A. F.

Rask, R. K.  
Rousselot, Abbé  
Schlegel, F.  
Schleicher, A.  
Schmidt, J.  
Sievers, E.  
Skeat, W. W.  
Stokes, W.  
Sweet, H.  
Thomas, André Antoine  
Taylor, W.  
Verner, K. A.  
Vigfusson, G.  
Webster, Noah  
Whitney, W. D.  
Zeuss, S. C.

## B. Literature

Literature, which is the expression, more or less permanent, in language, of human thought and emotions, would include in its widest sense every written record of man's activity, the university man's dissertation on the Coleoptera no less than Shelley's "Ode to the Skylark." Such a wide connotation of the term would render any classification within reasonable space limits impossible, and in the present chapter the matter has been restricted to the treatment of what we ordinarily call *Belles-lettres*. The great works in history and the various fields of science and philosophy will be accounted for in the chapters with the subject matter of which they are more intimately connected. A more considerable difficulty than that of settling limits to the scope of the term literature is that of determining a reasonably fixed standard of classification, owing to the twofold aspect under which

every literary monument presents itself—as form or matter. Taking, for instance, any specific department of literature, such as satire, we find that our satirist may be, as regards form, a lyricist, novelist, essayist, or dramatic writer. The man we call poet may, in the same manner, have turned the poetic form to the uses of comedy or of the lyric spirit. Again, commonly, a literary artist will have attained eminence in different categories of literature, as the drama, say, criticism, and poetry, and the necessity arises of partially and often arbitrarily characterizing such a man. A certain measure of violence is, therefore, unavoidable when the attempt is made to cast any great literary figure into a rigidly labeled department; but there is sufficient justification for the scheme in the fact that, as a rule, the great literary figure does stand out pre-eminently in one department of the art,

and, remembering that the line of division is by no means rigid, we may classify him accordingly.

The historical study of literature may be pursued in two ways. There is the vertical order, as it may be called, in which we take up the national literatures one by one, a method of study in which the various literary genres are considered at the same time, and wherein the formal side is naturally subordinated to the investigation of the development of national character as revealed in the national literature. There is also what may be called the horizontal order, where our attention is confined to one kind of literature at a time, whose development is traced from the beginning to the present day, across national boundaries, the process essentially being one of thematic unity, as compared with the preceding method of national unity. Either method has its advantages, and the material in the *New International Encyclopædia* has been so treated as to lend itself to either form of study; but, whereas the student or reader who would devote himself to the study of national literatures may be left to his own resources in view of the obvious classification followed, the need for guidance is apparent in the second. Emphasis, therefore, in the present chapter is laid on the formal development of the literary form, the underlying principle being the belief that the larger number of students are apt to turn to a specialized subject, like the history of the novel or the epic, rather than to the expanded story of an entire national literature.

## I. THE NATIONAL LITERATURES.

### American Literature

Arabic Language and Literature  
 Armenian Language and Literature  
 Australian Literature  
 Bengali Language and Literature  
 Breton Literature  
 Canadian Literature  
 Catalan Language and Literature  
 Chinese Language and Literature  
 Cuban Literature  
 Czech Literature  
 Danish Language and Literature  
 Dutch Literature  
 Egyptian Language and Literature  
     (under Egypt)  
 English Literature  
 Finnish Language and Literature  
 Flemish Language and Literature  
 French Literature  
 Frisian Language and Literature  
 German Literature  
 Greek Literature  
 Hindustani Language and Literature  
     ture  
 Hungarian Literature  
 Icelandic Literature  
 Iranian Languages and Literatures  
 Irish Literature  
 Italian Literature  
 Japanese Literature  
 Jewish Language and Literature  
     (under Jews)  
 Latin Literature  
 Lettic Language and Literature  
 Lithuanian Language and Literature  
     ture  
 Mexican Literature  
 Norwegian Literature  
 Old Church Slavic Language and  
     Literature  
 Pahlavi Language and Literature  
 Persian Literature  
 Polish Literature  
 Portuguese Literature  
 Portuguese-Brazilian Literature

Romance Literatures

Rumanian Language and Literature

Russian Literature

Scottish Language and Literature

Spanish Literature

Spanish-American Literature

Swedish Language and Literature

Syriac Language and Literature

Turkish Language and Literature

Yiddish

II. THE LITERARY FORMS. The broadest subdivision in literature according to form is that into prose and poetry; and, though it is often very difficult to differentiate one from the other in fact, and always hard to describe the distinction between them in theory, the common definitions of prose as the ordinary mode of speech and poetry as speech figurative, cadenced, and cast within certain comparatively rigid forms, may be followed safely enough for practical purposes. Either, taken in itself, may be subdivided into forms of narrower connotation, such as essay and novel under prose, epic and lyric under poetry. Here, however, appears the inconsistency already mentioned as inherent in literary classification; for the earliest scientific essays of the Greeks were written in verse, while Walt Whitman's lyric spirit finds expression in a medium closely akin to Ruskin's fervid prose. Again, the drama is probably nowadays regarded as a prose form, though as a matter of fact the world's greatest plays bear the poetic form. Poetry, then, if we exclude the drama, embraces the two subdivisions of the epic and the lyric. In the history of literary development, poetry precedes

prose, and of the two poetic forms the epic, as a rule, antedates the lyric.

1. EPIC POETRY. The epic may be defined as a lengthy narrative in verse, dealing with a subject of great magnitude in character, national or descriptive of a great movement. A distinction may be made between the epic which is the spontaneous expression of national life, constructed at an early period in national development out of pre-existing minor poetic forms, and the artificial epic of a more advanced cultural stage, which is the work of a single mind and in consequence purposive in its nature rather than spontaneous. Mention should also be made of the mock or beast epic, in nature largely satirical. See EPIC POETRY; and, for the great epics and epic poets of the world's literature, the following titles:

SANSKRIT:

Mahabharata

Rāmāyana

Purana

PERSIAN:

Firdausi

Shah Namah

Rustam

GREEK:

Homer

Age of Epic Poetry (under Greek Literature)

Cyclic Poets

LATIN:

Vergil

Æneas

Lucan

Silius Italicus

Statius

FRENCH:

Chansons de geste

Roland

Aymon

SPANISH :

Cid, The

Ercilla y Zúñiga

GERMAN :

Nibelungenlied

Klopstock

ITALIAN :

Dante

Boiardo

Ariosto

Tasso

PORTUGUESE :

Camões

NORSE :

Edda

Saga

FINNISH :

Kalevala

ENGLISH :

Beowulf

Milton

THE BEAST EPIC :

Homer; Greek Literature

Reynard the Fox

2. THE LYRIC. Lyric poetry, as the expression of personal feeling, is the most subjective of all literary forms. Originally written to be sung, the lyric has remained the nearest approach in literature to absolute music. Its scope is as wide as human emotion, broadening in the course of its development with the expansion of human sympathies. Its formal variations are numerous. See:

Lyric Poetry

Versification

Sonnet

Ode

Ballade

Rondeau

Madrigal

Canzone

Rhyme

Vers Libre

Lyric poetry attained great perfection in ancient Greece, though its field was narrower than that of modern poetry for comparative lack of the nature element, which, with us, is so conspicuous a feature of lyric expression. The Roman genius was, on the whole, unfavorable to the fostering of the lyric spirit. In the East, Persia produced a succession of poets of great excellence. See, for the great names in the realm of lyric poetry:

SANSKRIT :

Kalidasa

PERSIAN :

Nizami

Omar Khayyam

Sadi

Hafiz

Jāmi

LATIN :

Catullus

Tibullus

Horace

Ovid

Propertius

Ausonius

Prudentius

GREEK :

Alcman

Callinus

Archilochus

Tyrtæus

Simonides

Solon

Alcæus  
Sappho  
Anacreon  
Theognis  
Hipponax  
Pindar  
Bacchylides  
Timotheus  
Theocritus  
Bion  
Moschus  
Herondas

The lyric poetry of the Middle Ages was largely ecclesiastical, the Latin hymns of the period being especially marked by extraordinary effects of rhyme. The court singers of France and Germany, however, fostered the love theme assiduously. With the Revival of Learning came a great impetus to the poetic expression of secular emotions, Italy being the first to feel the impulse of the new movement. Lyricism languished during the domination of classical ideals in the seventeenth and eighteenth centuries, but, freed from the bond of artificiality, entered upon an unprecedented development towards the end of the latter century. See:

Hymnology  
Troubadours  
Trouvère  
Minnesinger  
Meistersinger  
Goliardic Literature  
Romanticism;

and for the lyric poets of Western Europe:

#### FRENCH:

Marie de France  
Meung, Jean de  
Villon

Marot  
Malherbe  
Pléiade  
Ronsard  
Chénier, Andre Marie  
Chénier, Marie Joseph  
Béranger  
Lamartine  
Delavigne  
Hugo  
Musset  
Gautier  
Leconte de Lisle  
Baudelaire  
Hérédia, José  
Sully-Prudhomme  
Verlaine  
Mallarmé  
Regnier, H.  
Rimbaud, J. A.  
Kahn, Gustave

#### PROVENÇAL:

Roumanille  
Jasmin  
Mistral, F.  
Gras, Félix  
Félibrige

#### ITALIAN:

Cavalcanti, Guido  
Cino da Pistoja  
Dante  
Petrarch  
Colonna, Vittoria  
Guarini  
Marini  
Chiabrera  
Metastasio  
Bondi, Clemente  
Foscolo, Ugo  
Leopardi  
Monti, V.  
Aleardi  
Giusti, Giuseppe

Carducci

Graf, A.

SPANISH:

Lopez de Ayala, Pedro

Santillana

Carcilasso de la Vega

León, Luis de

Figuerola, Francisco de

Argensola

Mendoza, Diego Hurtado de

Góngora y Argote

Zorrilla y Moral

Iriarte y Oroposa

Lista y Aragon

Melendez Valdes

Espronceda

PORTUGUESE:

Ferreira, A.

Gomes de Amorim

GERMAN:

Walther von der Vogelweide

Sachs, Hans

Fleming, Paul

Opitz

Bürger

Kleist, E. C.

Goethe

Schiller

Schlegel, A. W.

Arndt

Novalis

Chamisso

Uhland

Körner

Eichendorff

Heine

Rückert

Freiligrath

Bodenstedt

Scheffel

Auersperg

Hamerling

Ambrosius, Johanna

DUTCH:

Marnix

Vondel

Bilderdijk

Kate, J. J. ten

Eeden, F. Van

FLEMISH:

Maerlant

Bijns

Conscience, H.

The lyric poetry of Northern and Eastern Europe is recent in origin, dating from the eighteenth century. It has, as a rule, been under the influence of the great literary movements of the West, but, though largely mimetic in form, has been made the expression of national consciousness. See:

SWEDISH:

Bellman

Tegnér

Atterhom

Runeberg

Snoilsky

DANISH:

Heiberg, J. L.

Evald

Richardt

NORWEGIAN:

Welhaven

Wergeland

HUNGARIAN:

Kisfaludy

Arany

Petőfi

Erdélyi

RUSSIAN:

Derzhavin

Pushkin

Koltsov

Lermontov

Sheftchenko

Nekrasov

**POLISH :**

Naruszewicz  
 Karpinski  
 Mickiewicz  
 Kniaznin  
 Slowacki  
 Krasinski  
 Pol  
 Asnyck

The origins of the English lyric poetry may be traced back, if it be so desired, to early Anglo-Saxon times. The continuous history begins with Chaucer. Some of the most beautiful lyrics of the language are embodied in the works of the Elizabethan dramatists, after whom, and Milton, the art declines and hardens until revived by Burns and Wordsworth. English lyric in the nineteenth century has covered the field of human sympathies, from Blake's unseen world to Tennyson's studies in evolution and Kipling's in machine construction. See:

**ENGLISH :**

Cædmon  
 Ormulum  
 Layamon  
 Lydgate, John  
 Minot, Laurence  
 Barbour, John  
 Gower  
 Chaucer  
 Sackville  
 Shakespeare  
 Jonson  
 Milton  
 Ramsay, Allan  
 Donne  
 Herrick  
 Herbert  
 Waller  
 Crashaw

Cowley  
 Vaughan  
 Gay  
 Savage, Richard  
 Chatterton  
 Shenstone  
 Young, Edward  
 Thomson  
 Gray  
 Collins  
 Cowper  
 Blake  
 Burns  
 Hogg  
 Wordsworth  
 Landor  
 Moore  
 Keats  
 Shelley  
 Præd  
 Proctor, B. W.  
 FitzGerald  
 Tennyson  
 Browning  
 Clough  
 Arnold, Matthew  
 Ingelow, Jean  
 Patmore  
 Rossetti, Dante Gabriel  
 Rossetti, Christina  
 Morris  
 Arnold, Edwin  
 Swinburne  
 Massey, G.  
 Henley  
 Watson, W.  
 Kipling  
 Meynell, A. C.  
 Sharp, W.  
 Yeats, W. B.

**AMERICAN :**

Freneau  
 Barlow, Joel

Key  
Halleck  
Bryant  
Drake  
Emerson  
Whittier  
Longfellow  
Holmes  
Poe  
Lowell  
Hoffman, C. F.  
Whitman  
Cary, Alice and Phæbe  
Timrod  
Howe, Julia Ward  
Stedman  
Aldrich  
Lanier  
O'Reilly, J. B.  
Field, Eugene  
Riley  
Miller, Joaquin  
Moody, William Vaughan

chant, to complete secularization of the drama. The principles of the drama as propounded by Aristotle have remained for the most part the same; the mechanical technique has varied widely from original conditions. See:

Drama  
Theatre  
Stage  
Chorus  
Act  
Ballet  
Burlesque  
Farce  
Interlude  
Masque  
Vaudeville  
Pantomime  
Puppet  
Atellana  
Mime  
Prologue  
Epilogue

3. THE DRAMA. The Drama has been placed high among mimetic forms, because of the contribution it lays on the other arts, thus combining within itself their several qualities. Action and character are the subject matter. The means are bodily motion, which gives the sculptor's effect; language, which is the instrument of the poet; music, and scenery, and costume, to which painting and architecture give their share. The origins of the drama are to be found, most probably, in early religious ceremonial. Festivals marked by singing and dancing, the latter more or less symbolic in character, are common to peoples in a primitive stage; and the line of progress is along the development of the action and the spoken dialogue, at the expense of the

Greek drama had its origin in the worship of Dionysus. With Æschylus, tragedy is profoundly religious, and the actor's speeches are still subordinated to the choruses; Sophocles strengthened the element of action; Euripides thoroughly humanized tragedy. Attic comedy was fierce in personal satire and unbridled in speech. The Latin drama was sedulously modeled on the Greek. The origin of the Sanskrit drama is disputed, some deriving it from the Greek, others assigning it an independent development. See, for writers and plays:

SANSKRIT:  
Śūdraka  
Kalidasa  
Bhavabhūti  
Śakuntalā  
Mricchakatika



## GREEK:

Æschylus  
Phrynichus  
Sophocles  
Euripides  
Aristophanes  
Agathon  
Epicharmus  
Eupolis  
Menander

## LATIN:

Plautus  
Terence  
Seneca

In Mediæval times, practically the only species of dramatic performance was the religious spectacles of the Church, in which the purpose was didactic. See: MIRACLE PLAY; MORALITY; INTERLUDE; PASSION PLAY.

Out of the religious performances of the Middle Ages the modern drama developed. In France, which served as a model to the Continent, an elaborate system of rules was built up, supposedly bringing the drama into conformity with the standards of the classic age. The classic ideals, with their restriction of human emotions to kings and nobles, were overthrown on the Continent in the first half of the nineteenth century, since when the scope of the drama has been widened to embrace the entire complex of society. Like the novel, the drama of the latest days has become largely purposive. See, for the writers:

## FRENCH:

Mairet  
Regnard  
Corneille  
Racine  
Molière

## Marivaux

Chénier, M. J.  
Crébillon  
Beaumarchais  
Scribe  
Vigny  
Hugo  
Legouvé  
Labiche  
Ponsard  
Augier  
Dumas  
Pailleron  
Meilhac  
Halévy  
Sardou  
Rostand  
Maeterlinck  
Brieux  
Comédie Française

## ITALIAN:

Trissino  
Maffei  
Goldoni  
Gozzi  
Alfieri  
Manzoni  
Giacometti  
Annunzio, G. d'

## SPANISH:

Encina  
Vega Carpio  
Calderon de la Barca  
Moreto y Cabaña  
Moratín, Leandro Fernández  
Gil y Zárate  
Lopez de Ayala, Adelardo  
Hartzenbusch, J. E.  
Echegaray  
Breton de los Herreros

## PORTUGUESE:

Sá de Miranda  
Almeida-Garrett

The primacy in Continental drama, long held by the French, is disputed at the present day by the Teutons and the Slavs, more particularly the Scandinavian branch of the Teutons. See:

**GERMAN:**

Lessing  
Goethe  
Schiller  
Kotzebue  
Grillparzer  
Laube  
Gutzkow  
Anzengruber  
Heyse  
Sudermann  
Hauptmann  
Lindau, P.  
Hartleben  
Fulda

**SWEDISH:**

Almqvist  
Strindberg

**DANISH:**

Holberg  
Oehlenschläger

**NORWEGIAN:**

Ibsen  
Björnson

**RUSSIAN:**

Sumarokov  
Griboedov  
Gogol  
Ostrovski  
Zagoskin, M. N.  
Tolstoy, Alexei  
Tolstoy, Liou  
Gorky

**POLISH:**

Fredro  
Kniaznin  
Fredro the Younger

**HUNGARIAN:**

Kisfaludy, Károly  
Katona  
Szigligeti

While Continental Europe was enslaved by the rigid formulas of the classicists, in England the Romantic drama flourished from the beginning. The Elizabethan age is the golden age of the drama of the world. Following the Elizabethans came the decline, arrested partially by the talent of Dryden and Congreve during the Restoration, and of Goldsmith and Sheridan in the later part of the eighteenth century. In the nineteenth century, England brought forth no dramatic writer of conspicuous genius. See:

**ENGLISH:**

Udall  
Norton  
Sackville  
Kyd  
Lodge  
Peele  
Marston  
Greene  
Marlowe  
Shakespeare  
Nash  
Dekker  
Middleton  
Jonson  
Massinger  
Beaumont and Fletcher  
Ford  
Webster  
Davenant  
Dryden  
Wycherley  
Otway  
Congreve  
Farquhar  
Goldsmith

Sheridan  
 Knowles, J. S.  
 Beddoes, T. L.  
 Taylor, Tom  
 Robertson, T. W.  
 Sims, G. R.  
 Boucicault  
 Pinero  
 Jones, H. A.  
 Shaw, George Bernard  
 Phillips, Stephen  
 Barrie, J. M.  
 Galsworthy, John  
 Synge, J. M.  
 Masfield, John

## AMERICAN :

Dunlap, William  
 Payne, John Howard  
 Brougham, John  
 Boker  
 Sargent, Epes  
 Carleton, Henry Guy  
 Howard, Bronson  
 Campbell, Bartley  
 Thompson, Denman  
 Harrigan, Edward  
 Belasco, David  
 Fitch, William Clyde  
 Moody, William Vaughan

A partial list of the more noteworthy actors, of all times and all nations, is as follows:

Anderson, Mary A.  
 Archer, Belle  
 Arnould, Sophie  
 Arthur, Julia  
 Bancroft, Mary E. W.  
 Barrett, Wilson  
 Barry, Elizabeth  
 Barry, Spranger  
 Bates, Blanche  
 Bellamy, George Anne  
 Bernhardt, Sarah

Betterton, Thomas  
 Betty, W. H. W.  
 Booth, Agnes  
 Booth, Barton  
 Booth, Edwin  
 Booth, Junius Brutus  
 Bracegirdle, Anne  
 Burbage, Richard  
 Campbell, Beatrice  
 Clarke, J. S.  
 Clive, Catherine  
 Coghlan, Charles  
 Coghlan, Rose  
 Coquelin, B. C.  
 Crane, W. H.  
 Cushman, Charlotte  
 Davenport, E. L.  
 Davenport, Fanny  
 Déjazet, P. V.  
 Devrient, L.  
 Drew  
 Duse  
 Farren, Elizabeth  
 Fisher, Charles  
 Fiske, Minnie M.  
 Florence, W. J.  
 Forbes-Robertson, J.  
 Forrest, Edwin  
 Garrick, David  
 Gilbert, J. G.  
 Gillette, W. H.  
 Goodwin, N. C.  
 Haase, F.  
 Hackett, James H.  
 Hading, Jane  
 Hare, John  
 Haworth, Joseph  
 Herne, James A.  
 Irving, Henry  
 Janauschek, Fanny  
 Jordan, Dorothy  
 Kean, Edmund  
 Kean, C. J.  
 Kemble, Chas.

Kemble, Frances Anne  
 Kemble, John Philip  
 Kendal, Mr.  
 Kendal, Mrs.  
 Lecouvreur, Adrienne  
 Lemaître, A. L.  
 McCullough, J. E.  
 Macklin, Charles  
 Macready, W. C.  
 Mansfield, Richard  
 Mathews, Charles  
 Mathews, C. J.  
 Modjeska, H.  
 Morris, Clara  
 Mounet-Sully  
 Oldfield, Anne  
 Payne, J. H.  
 Placide, H.  
 Rachel, Mlle.  
 Rehan, Ada  
 Réjane, Mme.  
 Ristori, A.  
 Robson, Stuart  
 Roscius  
 Russell, Sol Smith  
 Salvini, A.  
 Salvini, T.  
 Siddons, Sarah  
 Sonnenthal, A.  
 Sothern, E. H.  
 Stoddart, J. H.  
 Thompson, Denman  
 Tree, Beerbohm  
 Vestris, Mme.  
 Wallack, J. L.  
 Wallack, J. W.  
 Willard, E. S.  
 Woffington, Margaret  
 Wyndham, Charles

4. THE NOVEL. The novel, at present the most flexible of literary forms, though of recent date in its present character, traces back to early and multiple sources. The beast tale,

common to all nations, the narrative of adventure, and the story of things supernatural, were the precursors of the novel. The love element becomes pronounced in the old Greek romances and assumes primary importance in the romances of the Middle Ages. The romance, it may be broadly put, passed into the novel, when the tale began to assume the character of a picture of contemporary life, a development to be assigned to the sixteenth century. See the article NOVEL.

The great monuments and figures of pre-modern story-telling are the following:

SANSKRIT:

Dandin  
 Subandhu  
 Bana

ARABIC:

Arabian Nights

GREEK AND ROMAN:

Heliodorus  
 Ephesiaca  
 Daphnis and Chloe  
 Apuleius  
 Apollonius of Tyre  
 Petronius

In Mediæval times, the romance flourished, combining in itself elements of the epic, the beast fable, and the tale of adventure and of love. Materials were largely drawn from ancient history, and the stories gathered around great figures of antiquity and the early Middle Ages. See:

Romance  
 Fabliaux  
 Gesta Romanorum  
 Alexander, Legend of  
 Charlemagne Cycle of Romances

Chrestien de Troyes  
 Wace  
 Roman de la Rose  
 Perceval  
 Tristram  
 Lancelot of the Lake  
 Malory  
 Grail, The Holy  
 Merlin  
 Chaucer  
 Morte d'Arthur  
 Euphues  
 Amadis of Gaul

Romance lacked characterization and reality. With the appearance of tales embodying observation of real types and description of manners, the novel as it is to-day begins. The origin is generally placed in Spain, where the rise of the picaresque tale marks the first step in character delineation. The subsequent development is rapid to present conditions, when the novel has become the all embracing term for all prose fiction, realistic, romantic, adventurous, or didactic. See for the writers:

#### FRENCH:

Scudéry, Madeleine de  
 Lafayette, Marie Madeleine de  
 Scarron  
 Lesage  
 Voltaire  
 Genlis, Countess de  
 Prévost d'Exiles  
 Saint-Pierre  
 Stendhal  
 Balzac  
 Hugo  
 Dumas, the Elder  
 Sue  
 Erckmann-Chatrian  
 Kock, Paul de

Sand, George  
 Merimée, P.  
 Flaubert  
 Goncourt  
 Feuillet  
 Daudet  
 Loti, Pierre  
 Zola  
 Bourget  
 Margueritte, P.  
 Prévost, E. M.  
 France, Anatole

#### ITALIAN:

Boccaccio  
 Manzoni  
 Amicis  
 Fogazzaro, A.  
 Verga, G.  
 Annunzio, Gabriele d'  
 Farina, S.  
 Serao, Matilda

#### SPANISH:

Cervantes  
 Aleman  
 Valera y Alcalá Galiano  
 Galdos  
 Palacio Valdés  
 Alarcón  
 Pereda  
 Pardo Bazán

#### GERMAN:

Goethe  
 Fouqué  
 Gutzkow  
 Eichendorff  
 Alexis, W.  
 Hauff  
 Laube  
 Auerbach  
 Reuter, Fritz  
 Tieck, L.  
 Freytag  
 Storm, Theodor

Scheffel  
Gerstäcker  
Spielhagen  
Anzengruber  
Dahn  
Heyse  
Ebers  
Frenssen

## SWEDISH :

Rydberg  
Bremer, Frederika  
Strindberg

## DANISH :

Blicher  
Drachmann

## NORWEGIAN :

Björnson  
Lie  
Kielland

## HUNGARIAN :

Jókai  
Eötvös

## RUSSIAN :

Gontcharov  
Pisemski  
Gogol  
Turgenev  
Dostoyevsky  
Tolstoy  
Korolenko  
Gorky  
Chekhov

## POLISH :

Kraszewski  
Sienkiewicz  
Orzeszkowa

Defoe began the line of great English novelists with what is still the greatest story of adventure in our literature. Fielding then perfected the form. Manners were acutely

studied by a succession of women writers, who bridged the eighteenth and nineteenth centuries. Barren practically of the drama, the latter century found expression in the novel to as fully great an extent as in lyric poetry. See:

## ENGLISH :

Behn, Afra  
Defoe  
Sterne  
Smollett  
Fielding  
Richardson  
Inchbald, Elizabeth Simpson  
Godwin  
Burney, Frances  
Radcliffe, Ann  
Edgeworth, Maria  
Scott  
Austen, Jane  
Porter, Jane  
Peacock, Thomas Love  
Lover, Samuel  
Borrow  
Lever, Charles  
Bulwer-Lytton  
Gaskell, Elizabeth  
James, G. P. R.  
Thackeray  
Marryat, Frederick  
Dickens  
Reade  
Trollope  
Kingsley, Charles  
Eliot, George  
Brontë, (Charlotte, Emily, Anne)  
Collins, Wilkie  
Blackmore  
Oliphant, Margaret  
Meredith, George  
Morris, William  
Du Maurier  
Black, William

Hardy, Thomas  
 Stevenson, Robert Louis  
 Russell, W. C.  
 Ward, Mrs. Humphry  
 Moore, George  
 Hawkins, Anthony Hope  
 Kipling, Rudyard  
 Conrad, Joseph  
 Gissing, George  
 Hewlett, Maurice  
 Quiller-Couch, A. T.  
 Wells, H. G.  
 Bennett, Arnold  
 Galsworthy, John

The nineteenth century produced in America in the realm of fiction a master romancer, Cooper, two masters in their art, Hawthorne and Poe, and at least two talented exponents of modern realism, James and Howells. See:

Brown, Charles Brockden  
 Cooper  
 Poe  
 Hawthorne  
 Hale, E. E.  
 Howells  
 Harte, Bret  
 James, Henry  
 Cable, George Washington  
 Fawcett, Edgar  
 Grant, Robert  
 Jackson, H. H.  
 Melville, Herman  
 Tourgee, A. W.  
 Wilkins, Mary  
 Allen, James Lane  
 Page, Thomas Nelson  
 Garland, Hamlin  
 Stockton, Frank R.  
 Norris, Frank  
 Atherton, Gertrude  
 Wharton, Edith

## 5. CRITICISM AND ESSAY.

1. The principles underlying artistic endeavor have been discussed since early Greek times, and may be divided into two classes, the universal laws of artistic expression, which have always been accepted, and the minor theories, more limited in scope and applying generally to individual arts, which never have been accepted by all, and never will be. Plato first studied in a thorough manner the relations of art to reality. Aristotle's *Poetics* laid down the principles that have undergone no essential change since his time. On the other hand, the blending of the classic spirit with the Teutonic, and the subsequent rise of chivalry and romance, produced differences of opinion regarding subject, scope, and manner that are in full force at the present day. See:

Criticism  
 Realism and Naturalism  
 Romanticism  
 Impressionist School of Painting  
 Décadents  
 Symbolists

2. Criticism in the beginning found expression in both prose and verse; the modern tendency has been decidedly towards prose, though there is not wanting a Pope's *Essay on Criticism* to continue the succession from Horace's *Ars Poetica*. The usual form, then, in which criticism at present finds expression is the Essay. See: ESSAY, and for the writers:

### GREEK:

Plato  
 Aristotle  
 Plutarch  
 Longinus

## LATIN :

Cicero  
Horace  
Seneca the Elder  
Varro  
Pliny  
Quintilian

## FRENCH :

Montaigne  
Saint-Évremond  
Corneille  
Boileau  
Voltaire  
Diderot  
Bayle  
Taine  
Cousin  
Lamartine  
Sainte-Beuve  
Michelet  
Sarcey  
France, Anatole  
Faguet, Émile  
Brunetière  
Lemaître, Jules  
Gourmont, Rémy de

## ITALIAN :

Dante  
Boccaccio  
Poliziano  
Vida  
Scaliger, J. C.  
Carducci, Giosuè  
De Sanctis, F.  
Gubernatis, A.  
Croce, B.

## GERMAN :

Reuchlin  
Winckelmann  
Gottsched  
Herder  
Lessing  
Schiller

Schlegel, Friedrich

Grimm

Scherer, W.

Menzel

Bahr, Hermann

Nordau, Max

## DUTCH :

Erasmus

## DANISH :

Rafn  
Brandes

## RUSSIAN :

Belinsky  
Pisarev

## ENGLISH :

Ascham  
Sidney  
Bacon, Francis  
Dryden  
Steele  
Addison  
Swift  
Johnson  
Pope  
Jeffrey  
Coleridge  
Wordsworth  
Lamb  
Hazlitt  
Wilson, John  
De Quincey  
Hunt, J. H. Leigh  
Carlyle  
Ruskin  
Arnold, Matthew  
Rossetti, W. M.  
Stevenson, Robert Louis  
Pater, W.  
Symonds, J. A.  
Saintsbury, George  
Stephen, Leslie  
Dowden, Edward  
Archer, William



Gosse, Edmund

Shaw, G. B.

AMERICAN:

Irving

Emerson

Ticknor, G.

Lowell

Fuller, Sarah Margaret

Curtis, G. W.

Whipple

White, Richard Grant

Hutton, Laurence

Mabie, Hamilton

Woodberry, George Edward

Winter, William

6. MORALISTS, SATIRISTS, AND HUMORISTS.

The study of human character and conduct has at all times received the attention of great minds, and what may be called ethical literature forms a very important part of the literature of the world. Near to constructive moralists, like Epictetus or Carlyle, stands the satirist, whose mission it is to combat the evil of degenerate times. The contemplation of the petty faults and incongruities of human character and action, so portrayed as to arouse laughter without arousing deep emotion of any kind, has always been a universal source of amusement. See:

GREEK AND ROMAN:

Aristophanes

Lucian

Epictetus

Ennius

Lucilius

Horace

Juvenal

Martial

Persius

Lucan

Tacitus

Petronius

Aurelius, Marcus

FRENCH:

Rabelais

Ménippée

La Bruyère

La Rochefoucauld

Pascal

Lesage

Voltaire

Chamfort, S. R.

France, Anatole

ITALIAN:

Jacopone da Todi

Aretino

SPANISH:

Quevedo y Villegas

GERMAN:

Fischart, Johannes

Brant

Hutten, Ulrich von

Epistolæ Obscurorum Virorum

Grimmelshausen

Rabener

Lichtenberg

Wieland

Tieck

Richter, Johann Paul

Reuter, Fritz

DUTCH:

Erasmus

Marnix

RUSSIAN:

Kantemir

Shtchedrin

Nekrasov

ENGLISH:

Langland (Piers Plowman)

Skelton

Bunyan

Butler

Dryden  
 Pope  
 Swift  
 Junius, Letters of  
 Arbuthnot  
 Byron  
 Carlyle  
 Smith, Sydney  
 Thackeray  
 Dickens  
 Calverley  
 Gilbert, W. S.  
 Mallock, W. H.  
 Lear, Edward  
 Jerome, Jerome K.  
 Shaw, G. B.

## SCOTCH:

Dunbar  
 Barclay

## AMERICAN:

Ward, Nathaniel  
 Franklin  
 Irving  
 Lowell  
 Holmes  
 Smith, Seba  
 Clemens, S.  
 Leland, C. G.  
 Locke, D. R.  
 Browne, C. F.  
 Bunner, H. C.  
 Shaw, H. W.  
 Stockton, F. R.  
 Nye, E. W.  
 Dunne, Finley Peter

## 7. ORATORY.

The art of eloquent persuasion is found among all primitive peoples where social bonds have become of some importance. Oratory attains its fullest development in the Greek democracies, where the citizen was called upon to take so considerable a share in the

public life. The political and juristic genius of the Roman was likewise favorable to the development of the art. Pulpit eloquence had some of its greatest masters among the early Fathers of the Church, which has never been wanting in masterly exponents of its doctrines. A great period in the history of oratory was the age of the French Revolution, when, contemporaneously in England too, a succession of great orators lent lustre to the reign of George III. In the United States, the revolutionary period, and the period of rapid national growth, produced a brilliant series of orators, culminating in the classic triad, Clay, Webster, and Calhoun. At present oratory may be considered a declining art, especially as related to secular affairs; and, though its power over the multitude may still be felt in electoral campaigns, its influence in legislative bodies has largely passed away. See ORATORY; and, for the great orators of all ages:

## GREEK:

Pericles  
 Gorgias  
 Isocrates  
 Lysias  
 Andocides  
 Isæus  
 Æschines  
 Demosthenes  
 Athanasius  
 Chrysostom  
 Basil the Great

## ROMAN:

Cato of Utica  
 Hortensius  
 Cicero  
 Ambrose

**FRENCH :**

Bossuet  
 Bourdaloue  
 Massillon  
 Fénelon  
 Mirabeau  
 Barnave  
 Vergniaud  
 Guadet  
 Danton  
 Robespierre  
 Royer-Collard  
 Lamartine  
 Lacordaire  
 Thiers  
 Gambetta  
 Jaurès, J. L.

**ITALIAN :**

Mazzini

**SPANISH :**

Castelar

**HUNGARIAN :**

Kossuth

**ENGLISH :**

Taylor, Jeremy  
 Baxter, Richard  
 Whitefield  
 Mansfield  
 Burke  
 Pitt, the Elder  
 Pitt, the Younger  
 Fox, C. J.  
 Sheridan, R. B.  
 Erskine, Lord  
 Canning  
 Bright, John  
 Gladstone  
 Drummond, Henry  
 Spurgeon, C. H.

**IRISH :**

Curran  
 Grattan

O'Connell

Emmet

**AMERICAN :**

Otis, James  
 Henry, Patrick  
 Lee, Richard Henry  
 Ames, Fisher  
 Channing, W. E.  
 Randolph, John  
 Wirt, William  
 Benton  
 Clay  
 Webster  
 Calhoun  
 Hayne  
 Everett  
 Choate, Rufus  
 Seward, W. H.  
 Sumner, Charles  
 Stephens, Alexander  
 Beecher, H. W.  
 Douglas, Stephen A.  
 Evarts, W. M.  
 Edmunds, George  
 Conkling, Roscoe  
 Ingersoll, Robert  
 Brooks, Phillips  
 Bryan, William Jennings  
 Choate, Joseph H.

**8. THE FABLE.**

Probably it was the inhabitants of India who first ascribed human wisdom and language to animals. From India the fable passed westward, and, beginning with the Greek *Æsop*, we find practically the same scheme and contents in all European fabulists. See:

**INDIA :**

Pancatantra  
 Bidpai

**ARABIAN :**

Lokman

**GREEK :**

Æsop

**LATIN :**

Phædrus

**FRENCH :**

Marot

La Fontaine

Perrault

Florian

Laboulaye

**RUSSIAN :**

Krylov

**GERMAN :**

Hagedorn

Gellert

Lessing

Grimm

**NORWEGIAN :**

Asbjørnsen

Moe

**DANISH :**

Andersen

**ENGLISH :**

Gay

Amiel

Selden : Table Talk

Pepys

Evelyn

Walpole, Horace

Chesterfield

**10. JOURNALISM.**

The press, which must be regarded as an important element in the literary life of any nation, may be studied under the following heads :

Periodical Literature

Journalism, College

Newspaper

Punch

Figaro

Times, The

Printing

A partial list of noteworthy names in journalism is as follows :

About, Edmond

Blowitz, Henri Georges

Bonner, Robert

Bowles, Samuel

Creelman, James

Curtis, W. E.

Dana, C. A.

Forbes, Archibald

Godkin, E. L.

Greeley, Horace

Halstead, Murat

Harden, Maximilian

Kennan, George

Labouchère, Henry

Lemon, Mark

Norman, Henry

Northcliffe, Lord

Pulitzer, Joseph

Raymond, H. J.

Reid, Whitelaw

Rocheftort, Henri

Russell, W. H.

Sala, G. A. H.

**9. PERSONAL LITERATURE.**

This name may be applied to such productions as diaries, memoirs, letters, and "confessions" of distinguished men and women, or men and women whose experiences in life have been extraordinary. Written, it may be presumed, for the purpose of self-expression, they are valuable indexes of character, motives, and causes. See :

Letters in Literature

Aurelius, Marcus : Meditations

Augustine : Confessions

Sévigné, Marquise de

Saint-Simon : Mémoires

Rousseau : Confessions

Senancour : Obermann

Smalley, G. W.  
Stanley, H. M.  
Stead, W. T.  
Steevens, G. W.  
Taylor, Bayard  
Traill, H. D.  
Villiers, F.  
Watterson, Henry  
Weed, Thurlow  
White, Horace  
Wilkinson, H. S.  
Young, J. R.

11. MISCELLANEOUS TITLES.

Manuscript  
Manuscripts, Illumination of

Papyrus  
Palimpsest  
Paleography  
Codex  
Coster  
Gutenberg  
Fust  
Elzevir  
Manutius  
Foulis  
Encyclopædia  
Dictionary  
Larousse  
Brockhaus  
Copyright  
Literary Property

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# Chapter 10. The Fine Arts

## (Architecture)

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**T**HE study of the fine arts may be approached from one of three different points of view. The first of these is the historical, in which the student desires to obtain a comprehensive view of the art of a nation or of an entire period, its general characteristics and development. Another is the artistic, in which knowledge of a particular art or of some of its aspects is desired. A third is the biographical, in which the interest centres about an individual artist. To meet the first point of view, the *New International Encyclopædia* contains general articles treating the architecture, sculpture, painting, and minor arts of certain nations and periods. These general articles may best be divided into two groups: those treating the art of Oriental nations, whose artistic development is remotely or not at all concerned with the general European evolution; and those dealing with the great periods of artistic development participated in by the Occident in general. This division obviates the necessity for general articles on the art of separate European countries, as, for instance, French art, which will be found treated under ROMANESQUE, GOTHIC, and RENAISSANCE ART, and in the general articles ARCHITECTURE, SCULPTURE, PAINTING. The artist's point of view is represented by general articles on Painting, Sculpture, and Architecture, and by articles on the various schools, and on technical terms and processes. The biographical side is fully dealt with in the lives of all the principal artists. The art museums are usually described under the titles of the cities in which they are situated; but a few are of sufficient importance to require separate articles. The principal schools of design are described in the general article upon that subject and in special articles on the more important schools. The description of celebrated representations in painting and sculpture is usually given in the biography of the artist who produced them. The article MYTHOLOGY IN ART gives a general treatment of such representations in Classic Art, which are further treated under the names of the subjects represented, as JUPITER, HERCULES, ACHILLES. The article ICONOGRAPHY similarly treats Christian Art, and there are special articles on a number of important themes of artistic treatment, such as CHRIST IN ART and MADONNA.

### A. General Articles

#### I. INTRODUCTORY:

Art  
Art, Primitive  
Æsthetics

Assyrian Art  
Jewish Art  
Phœnician Art  
Mohammedan Art  
Persian Art  
Indian Art  
Chinese Art  
Japanese Art

#### II. ORIENTAL ART:

Egyptian Art  
Babylonian Art

## III. EUROPEAN DEVELOPMENT:

Greek Art  
 Etruria  
 Roman Art  
 Christian Art  
 Byzantine Art  
 Monastic Art  
 Romanesque Art  
 Lombard Art  
 Gothic Art  
 Renaissance Art

## IV. ART MUSEUMS, SOCIETIES, AND SCHOOLS:

Design, Schools of  
 École des Beaux-Arts  
 National Academy of Design  
 Society of American Artists  
 Royal Academy of Arts  
 Saint Luke, Academy of  
 British Museum  
 Louvre  
 Luxembourg Palace  
 Pitti Palace  
 Uffizi

## B. Architecture

In its widest sense, Architecture includes any kind of construction; but, in the *New International Encyclopædia*, the term is usually restricted to building which attains the dignity of art. Purely technical and utilitarian phases of architecture are treated under BUILDING, FIREPROOF CONSTRUCTION, MASONRY, and similar titles. (See the chapter on Manufactures and Engineering.) The three principal varieties of architecture are civil, religious, and military; and under these heads will be found their chief subdivisions. A few of these call for more detailed treatment of the component parts, and these are best enumerated below in connection with that style under which they were principally developed; as, for instance, TEMPLE under Greek Architecture, CHURCH under Early Christian, MONASTERY and CASTLE under Romanesque. Most celebrated works of architecture are treated in the articles on those cities in which they are situated; but a number of buildings of especial interest are

treated separately, and in the following scheme of study, such buildings are enumerated under the different styles of architecture of which they are representative. For example, PARTHENON, ERECHTHEUM, etc., appear under Greek Architecture, NOTRE DAME DE PARIS and WESTMINSTER ABBEY under Gothic.

## I. CIVIL ARCHITECTURE:

Municipal Architecture  
 Forum  
 Palace  
 Fountain  
 Villa  
 Mausoleum  
 Theatre  
 Amphitheatre  
 Circus  
 Bath  
 Town Hall  
 Arch, Triumphal  
 Aqueduct  
 Bridge

## II. RELIGIOUS ARCHITECTURE:

Temple

Church  
Cathedral  
Monastery  
Oratory  
Baptistery

### III. MILITARY ARCHITECTURE:

Acropolis  
Citadel  
Castle  
Camp  
Fortification

### IV. TECHNICAL TERMS.

A large number of architectural terms deserve special treatment. Some of these, which are general in their application, are enumerated below, while others, the application of which is restricted to a particular style, are enumerated under that style; as, for example, **MOSQUE** under Mohammedan. See:

Arabesque  
Arcade  
Arch  
Balcony  
Balustrade  
Bay Window  
Belfry  
Ceiling  
Colonnade  
Column  
Cupola  
Dome  
Door  
Doorway  
Façade  
Floor  
Hall  
Molding  
Orders of Architecture  
Ornament  
Panel

Pendentive  
Pilaster  
Pillar  
Porch  
Portal  
Roof  
Spire  
Tower  
Tracery  
Window

### V. HISTORIC STYLES AND BIOGRAPHY.

Architecture is the most ancient and, perhaps, the most important of the fine arts. In most artistic developments, both painting and sculpture have been subordinate to it. Its historical treatment, therefore, forms an extensive and important part of the general department of architecture in the *Encyclopædia*. A general historical sketch of its development, from the most ancient times to the present, is given in the article **ARCHITECTURE**. This should be supplemented by the copious articles on the great historic styles, with the biographical additions given in the following list. Our treatment will outline the salient features of the different styles, beginning with those Oriental nations whose architecture lies remote from the European development—such as China, India, and Japan. We then proceed to those ancient nations, like Babylonia and Egypt, which materially influenced the Greek architecture. From Greek architecture, is descended the Roman, and from the Roman, the Mediæval and Renaissance styles, and finally the architecture of the present day.

#### 1. *India.*

The architecture of India begins with the Buddhist style (B. C. 300-A. D.



700), whose buildings are of three classes: stupa or tope (a mound enclosing a relic); rock temples (chaityas); and monasteries (viharas). The Neo-Brahmanic style (beginning A. D. 700) comprises many varieties, including the so-called Jaina and Dravidian. It developed the architectural detail, the over-rich ornamentation, the pagodas and gopuras of the South. The Mohammedan architecture of India, differing materially from these styles, is best treated under MOHAMMEDAN ART. See:

Indian Art  
Tope  
Vihāra  
Ellora  
Vijayanagara  
Boro Buddor  
Elephanta  
Mohammedan Art

## 2. *China and Japan.*

The most characteristic feature of Chinese architecture, which begins in the first century B. C., after the advent of Buddhism, is the tiled roof of tent-like form. Others are the pagoda, the pail-loo (a monumental gateway), and elaborately colored surface decoration. Japanese architecture, which begins with the seventh century A. D., is even less massive. It makes more of timber construction, and spends more upon roof effects than the Chinese. See:

Chinese Art  
Japanese Art  
Pagoda

## 3. *Babylonia and Assyria.*

The earliest dated architectural remains are those of the Babylonians, from as far back as B. C. 6000. Their build-

ing material was brick, and they were the first to construct vaults and arches. Their most important buildings were the temples, which were stepped pyramids of great height, brilliantly colored with glazed tiles. Their city walls were of amazing height and thickness.

Assyrian architecture was derived from the Babylonian, but was more secular in character, the chief buildings being the royal palaces, in which it perfected decorative relief sculpture of a high order. See:

- (a) Babylonian Art
  - Babylon
  - Babel, Tower of
  - Nippur
  - Erech
  - Ur
- (b) Assyrian Art
  - Nineveh
  - Nimrud
  - Khorsabad
  - Koyunjik

## 4. *Persia, Phœnicia, Judea.*

The Babylonian-Assyrian influence was determinative for the architecture of the Hittites, and for the utilitarian art of the Phœnicians, who built for Solomon the Temple at Jerusalem. Ancient Persian architecture shows a mingling of Babylonian with Egyptian and Greek influences; but, under the Parthian and Sassanian dynasties, it reverted to purer Oriental types. See:

Hittites  
Phœnician Art  
Jewish Art  
Temple at Jerusalem  
Persian Art  
Ecbatana  
Susa

Pasargadae  
Firuzabad

### 5. Egypt.

The architectural monuments of the Old Empire (B. C. 4500-2160) are chiefly sepulchral—pyramids, mastabas, and tomb-temples. Temple architecture took on a new development with the Middle Empire (B. C. 2160-1788), and attained its highest development under the New Empire (B. C. 1588-1150), which followed the disastrous interruption of the Hyksos invasion. After a long decline, there was a brilliant revival under the Ptolemies in the third century B. C. The temples were often, like the Ramesseum, sepulchral; some were rock-cut, as at Abu-Simbel; some partly hewn and partly constructed, as at Deir-el-Bahri. The greatest temples are those of Karnak, Luxor, Medinet-Habu, Abydos, the Ramesseum, and the Ptolemæ and Roman temples of Denderah, Philæ, and Edfu. For descriptions, consult the section *Architecture*, under EGYPTIAN ART. See:

Egyptian Art  
Pyramid  
Mastaba  
Mêdûm  
Luxor  
Thebes  
Karnak  
Edfu  
Elephantine  
Abu-Simbel  
Deir-el-Bahri  
Ramesseum  
Medînet Habu  
Denderah  
Philæ  
Beni-Hassan

### 6. Greece.

The Mycenæan architecture in Greek lands, sometimes known as the Ægean style, is described under ARCHÆOLOGY, and in the articles on the principal sites of this culture. From the main hall of the Mycenæan palace was evolved that marvelous structural masterpiece, the Greek Temple, the final type of which appears in the seventh century B. C. For a description of this temple, which is the central figure of Greek architecture, consult GREEK ART. The origin and development of the two principal styles of temple architecture, Doric and Ionic, are treated under ARCHITECTURE and ARCHÆOLOGY. The earliest examples of the Doric are in Sicily and Southern Italy, and it attained perfection during the fifth century, in buildings like the Parthenon and Theseum at Athens, and in the temples of Pæstum. The Ionic order was increasingly used in the fourth century B. C., as at Miletus and Ephesus, the Corinthian being as yet used for small monuments only. The Hellenistic age saw a great development of architecture of a private, civil, and sepulchral character, like the stoa, propylæa, theatre, odeon, and mausoleum.

#### (a) General Titles:

Cyclopean Architecture  
Archæology  
Greek Art  
Temple  
Doric Order  
Ionic Order  
Corinthian Order  
Column  
Fluting  
Entablature  
Base

Pediment  
 Frieze  
 Cornice  
 Acanthus  
 Pæstum  
 Agrigentum  
 Selinus  
 Segesta  
 Parthenon  
 Theseum  
 Erectheum  
 Phigalia  
 Miletus  
 Diana, Temple of  
 Teos  
 Magnesia

(b) Civil Architecture:

Propylæa  
 Stoa  
 Colonnade  
 Stadium  
 Theatre  
 Mausoleum  
 Choragic Monument

(c) Biography:

Ictinus  
 Callicrates  
 Mnesicles

7. *Rome.*

For a general view of Roman architecture, the student is referred to **ROMAN ART**. The early architecture of Rome is practically Etruscan, and to this people the Romans owe their knowledge of vaulting and the arch. At the close of the republican epoch, they adopted Greek orders, evincing special preference for the Corinthian, which they developed into an independent order, and from which they evolved the so-called composite. These forms were decoratively used as adjuncts of con-

struction. The principal works of Roman architecture were great civil structures, like the fora, triumphal arches, amphitheatres, thermæ, aqueducts, besides many superb temples. The highest development was during the first 150 years of the empire, after which came the decline. See:

(a) Etruria (section on Art)

Cloaca  
 Roman Art  
 Aqueduct  
 Tabularium  
 Forum  
 Trajan, Forum of  
 Basilica  
 Pantheon  
 Theatre  
 Amphitheatre  
 Arch, Triumphal  
 Trajan, Arch of  
 Titus, Arch of  
 Constantine, Arch of  
 Septimius Severus, Arch of  
 Antonine Column  
 Caracalla, Baths of  
 Diocletian, Baths of  
 Tivoli  
 Pompeii  
 Herculaneum  
 Baalbek  
 Palmyra

(b) Biography:

Apollodorus

8. *Early Christian.*

Early Christian architecture is an adaptation of the declining Roman to the needs of Christian worship. The requirement was a large interior for many worshipers, resulting in the development of the basilical construction, which became typical for church build-

ing. The component parts of the basilica are discussed in the articles listed below under **Basilical Construction**. The article **CHURCH** gives the general development of the church building. To this is added a list of other terms of ecclesiastical architecture.

(a) **Basilical Construction:**

- Basilica
- Apse
- Transept
- Atrium
- Nave
- Altar
- Choir
- Confessional

(b) **Church, etc.:**

- Church
- Catacombs
- Chancel
- Chapel
- Crypt
- Font
- Reredos
- Sacristy

9. *Byzantine.*

In the eastern half of the Roman Empire, the Byzantines developed the domical construction, inventing the pendentives to support the dome. Byzantine architecture was also characterized by rich mosaic decoration. Its great masterpieces are the Church of Saint Sophia at Constantinople and Saint Mark's at Venice. It prevailed throughout the Eastern Empire until its destruction by the Turks; in Southern Italy, Sicily, Venice, and Ravenna; in Armenia, the Balkans, and wherever else the Greek Church prevailed. Russian architecture is a development of the Byzantine. See:

Byzantine Art

Mosaic

Dome

Pendentive

Saint Sophia

Saint Mark's Church

Anthemius (of Tralles)

10. *Mohammedan.*

Coincident with the Mohammedan conquests, a style of architecture arose based upon the Byzantine and Persian. Its golden age began with the tenth century, and the final types were attained in the eleventh. The ultimate type of the mosque was built on the court-plan, with pointed arches, highly colored geometrical ornament, and dome vaulting. The principal schools were the Moorish (Spain), Egyptian, Turkish, Persian, and the Mohammedan styles that grew up in India. All these are described in **MOHAMMEDAN ART**, besides which there are articles upon the most prominent features of Mohammedan architecture. See:

Mohammedan Art

Mosque

Minaret

Tekiyé

Bazar

Caravanserai

Alhambra

Taj Mahal

11. *Romanesque (A. D. 800-1200).*

In Middle and Western Europe, Early Christian architecture was succeeded by the Romanesque, which was pre-eminently the art of the monastic orders and of feudalism. Among its innovations were the cruciform plan, the developed crypt, and the incorporation of bell-towers with the church building. But the principal achieve-

ment of Romanesque architecture was the perfection of vaulting,—the dome and tunnel vault in Southern France, and the groined vault in Lombardy, the Rhinelands, Normandy, and England. It thus led the way to the development of the pointed arch and Gothic architecture. The basis of the study of Romanesque architecture should be the appropriate section of **ROMANESQUE ART**. See:

Romanesque Art  
Lombard Art  
Norman Architecture  
Vault  
Crypt  
Bell-Tower  
Castle  
Keep  
Bailey  
Tower  
Bastion  
Barbican  
Wartburg  
Monastery  
Cloister  
Chapter-house  
Dormitory

## 12. *Gothic*.

Gothic architecture is the development of Romanesque groined vaulting. By means of the pointed arch, the most characteristic feature of the system, the vertical strains are concentrated in powerful piers, the horizontal thrusts on flying buttresses, permitting light walls, huge windows and an infinite wealth of statuary and tracery. Gothic architecture originated in France in the twelfth century, and there it also attained its most perfect development in the thirteenth, declining into the Flamboyant style of the fifteenth century.

Spanish Gothic of the thirteenth century is second only to the French, though later debased by too much ornament. In England, a peculiarly national style arose, which should be studied under the headings by which three varieties are usually known, **EARLY ENGLISH**, **DECORATED**, and **PERPENDICULAR**. At its best, the German Gothic is noted for its beautiful tracery and spires. In Italy, the Gothic style is purely decorative, and it produced a charming style of civic buildings, especially in Tuscany and Venice. The basis of study should be the article, **GOthic ARCHITECTURE**, supplemented by the articles on special churches, and the descriptions in the articles on the cities, a few of which are appended. See:

### (a) Gothic Architecture

Vault  
Flamboyant  
Early English  
Decorated Style  
Perpendicular  
Fan-Tracery Vaulting  
Notre Dame de Paris  
Sainte Chapelle  
Westminster Abbey  
Santa Croce

### (b) Cathedral Cities:

Rheims  
Amiens  
Burgos  
Lincoln  
Salisbury  
York  
Canterbury  
Winchester  
Cologne  
Strassburg  
Nuremburg

Freiburg

Milan

Florence

Siena

Orvieto

(c) Biography:

Montreuil, Pierre de

William of Wykeham

Erwin

Arnolfo di Cambio

13. *Renaissance.*

(a) Italy.

Renaissance architecture is the adaptation of classical forms, as they survived in Roman remains, to the architectural needs of the day. The Early Renaissance (fifteenth century) originated in the works of Brunelleschi at Florence, whence it was introduced into the rest of Italy. Its work was decorative in character, the constructive side being rather developed by the Roman school, headed by Bramante. The tendency was increasingly towards the formal classicism evinced in the works of Palladio and Vignola. As a reaction, came the freer but exaggerated Barocco of the seventeenth and eighteenth centuries. The basis of study should be the section *Architecture*, under RENAISSANCE ART.

(i) Prominent Buildings:

Certosa

Doge's Palace

Pitti Palace

Lante, Villa

Villa, Giulia

Saint Peter's Church

(ii) Biography:

Brunelleschi, Filippo

Michelozzi, Michelozzo

Alberti, Leone Battista

Giuliano da Majano

Laurana, Luciano da

Sangallo

Bramante, Donato d'Agnolo

Peruzzi, Baldassare

Sansovino, Jacopo

Michelangelo

Vignola, Giacomo Barozzo da

Palladio, Andrea

Serlio, Sebastiano

Scamozzi, Vincenzo

Fontana, Domenico

Maderna, Carlo

Bernini, Giovanni Lorenzo

Borromini, Francesco

Ammanati, Bartolommeo

Longhena, Baldassare

(b) Other Countries.

Outside of Italy, the most important development of Renaissance architecture was the French. Its most original type was the mediæval castle transformed into the palace of the Renaissance. There was constant influence from Italy, but the later French Barocco is superior to the Italian. In Germany, the Gothic elements survived late, and materially influenced the incoming Renaissance. A similar development occurred in other European countries. Spain made use of much elaborate decorative detail. The Renaissance appeared latest of all in England in the seventeenth century. A kind of Palladian High Renaissance, adopted by Inigo Jones, and developed by Wren, retained a purifying influence during the eighteenth century, until the advent of classic revival.

(i) France:

Palace

Chambiges, Martin

Bullant, Jean  
 De l'Orme, Philibert  
 Lescot, Pierre  
 Brosse, Salomon de  
 Mansart  
 Fontainebleau  
 Louvre  
 Tuileries  
 Luxembourg Palace

(ii) Great Britain:

Jones, Inigo  
 Wren, Sir Christopher  
 Van Brugh, Sir John  
 Hawksmoor, Nicholas  
 Chambers, Sir William  
 Nash, Sir John  
 Dance, George  
 Saint Paul's Cathedral  
 Whitehall

14. *Nineteenth Century.*

The reaction against the exaggerated styles of the eighteenth century was an imitation of classical forms. In France, Roman forms were predominant in the great structures of the Republic and first Empire; but, in England and Germany, Greek forms were more closely followed. About 1830 came the Gothic revival, which attained especial development in England, in such buildings as the Houses of Parliament and numberless churches. The present tendency is towards Renaissance forms and greater freedom from tradition.

The tasteful colonial architecture of the United States followed English models, but the early republic adopted the classic revival (Capitol). The period of the Civil War (till 1870) was singularly unfruitful; but between 1870 and 1880 there was a revival of the artistic spirit. The problem of

the artistic treatment of the skyscraper with the steel-frame construction is as yet unsolved; but constant improvement is being made. The basis of study should be the section on the *Nineteenth Century*.

(a) France:

Soufflot, Jacques Germain  
 Percier, Charles  
 Fontaine, P. F. L.  
 Viollet-le-Duc  
 Visconti, L. T. J.  
 Garnier, J. L. C.

(b) Germany and Austria:

Gärtner, Friedrich von  
 Schinkel, Karl Friedrich  
 Klenze, Leo von  
 Hansen, Theophilus von  
 Semper, Gottfried

(c) Great Britain:

Soane, Sir John  
 Smirke, Sir Robert  
 Pugin, Augustus  
 Pugin, Augustus N. M.  
 Wyatt, Sir Matthew D.  
 Fergusson, James  
 Scott, Sir George Gilbert  
 Street, George Edmund  
 Barry, Sir Charles  
 Waterhouse, Alfred  
 Paxton, Sir Joseph  
 Parliament, Houses of

(d) United States:

Latrobe, Benjamin Henry  
 Bulfinch, Charles  
 Walter, Thomas Ustick  
 Renwick, James  
 Upjohn, Richard  
 Hunt, Richard Morris  
 Richardson, H. H.  
 McKim, Charles F.

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# Chapter 11. The Fine Arts

## (Sculpture and Painting)

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(Read general introduction at the opening of preceding chapter.)

### A. Sculpture

The study of sculpture centres about the general article on that subject. In this article will be found sections on the technical processes and materials, especially the modern, and on the different forms of sculpture, and a sketch of the history of sculpture, containing a description of the characteristics and the development of the different schools, as revealed in their principal artists. The study of the technical forms and processes of sculpture should be supplemented by the special articles enumerated below, which also contain historical sketches of these subjects; that of the history by those on the different schools and epochs of art, and above all by the biographies of the artists, some of which are enumerated below.

#### I. BRANCHES AND TECHNIQUE OF SCULPTURE.

- Carving
- Chasing
- Founding
- Relief Sculpture
- Equestrian Statue
- Bronze
- Chryselephantine
- Goldsmith's Work
- Terra Cotta
- Ivory
- Metal Work
- Wood-carving
- Stucco

#### II. GREEK AND ROMAN SCULPTURE.

The sculpture of Oriental countries

is decorative in character, and therefore best considered in connection with their architecture, under the titles of the division Oriental Art, enumerated in Chapter 9, Section A. Among the Greeks, sculpture first attained the dignity of an independent art, and achieved the highest ideal perfection in the world's history. The study of the separate epochs of Greek sculpture should be based upon the articles ARCHÆOLOGY and GREEK ART. Its rude beginnings date from the seventh century B. C., and by the end of the archaic period (B. C. 480) the emancipation was well advanced. The Attic period (480-323), during which the chief art centre was at Athens, witnessed the highest development of Greek art. It is ushered in by a period of transition (till about 450), in which great progress was made towards mastery of technique. The last half of the fifth century, the age of Phidias, begins the golden period of Greek art. The greatest technical knowledge was subordinated to idealism and self-restraint, and to the utmost nobility of conception. The golden age continued during the epoch of Praxiteles and Scopas, which, though still ideal, was more realistic and interested in individual traits and features. It succeeded especially well in portraiture, and attained the highest mastery of technique. During the Hellenistic age (323-146), the centres of art passed from Greece to Asia and Egypt, to



Pergamus, Rhodes, and Alexandria. Art came more into the service of individuals, and, notwithstanding the highest technical skill, it often sought sensational or trivial subjects. Roman sculpture is, for the most part, copied from the Greek, and shows little originality except in a fine realistic rendition of portraiture, and in pictorial relief-sculpture. See:

1. *The Archaic Period:*

Archæology  
Greek Art  
Antenor

2. *The Attic Period:*

Æginetan Sculptures  
Calamis  
Pythagoras of Rhegium  
Myron  
Discobolus  
Phidias  
Elgin Marbles  
Polyclitus  
Agoracritus  
Cresilas  
Pæonius  
Cephisodotus  
Praxiteles  
Demétrius  
Scopas  
Mausoleum  
Marsyas

3. *The Hellenistic Period:*

Lysippus  
Pergamon  
Zeus Atricoli  
Apollo Belvidere  
Venus of Milo  
Laocoön

4. *The Roman Sculpture:*

Section *Sculpture* under Roman  
Art  
Venus of Medici

### III. MEDIEVAL SCULPTURE.

The decorative sculpture of the Middle Ages can best be studied in connection with the architecture of the period, under the titles of the mediæval epochs enumerated in Chapter 9, Section A. The history of modern sculpture begins with the Italian revival of the thirteenth century. Nicola Pisano found his models in the antique, but his son Giovanni reverted to the Gothic, and his naturalistic, dramatic style prevailed in Italy. The Pisan School was the mother of those of Florence and Siena. The former was superior in technique and composition, the latter was rather picturesque and narrative in character. During the entire Middle Ages, and to some extent during the Renaissance, the usages of Church worship furnished abundant opportunity for the sculptor's art. See:

1. *First Revival in Italy* (under Sculpture)

Christian Art  
Byzantine Art  
Romanesque Art  
Gothic Art  
Antelami, Benedetto  
Pisano, Nicola  
Pisano, Giovanni  
Pisano, Andrea  
Arnolfo di Cambio  
Andrea di Ugolino  
Orcagna, Andrea

2. *Ecclesiastical Sculpture:*

Altar  
Pulpit  
Ambo  
Cross  
Crucifix  
Reliquary

Chalice  
Tomb

#### IV. THE RENAISSANCE.

The sources of inspiration during the Renaissance were the study of nature and of the antique, as it survived in ancient statues. The chief characteristic of the Early Renaissance is a healthy naturalism. It attained a high perfection, in relief as in statuary, and excelled equally in bronze, marble, and terra cotta. The centre of the art was Florence, and the dominant figure during the fifteenth century, amid a brilliant array of artists, was Donatello. The school of Siena was more sentimental in feeling and elaborate in decoration; those of Lombardy and Venice were luxuriant in decoration, the former being more vigorous in form. The High Renaissance is characterized by a deeper knowledge and greater influence of the antique and by a more universal style, notably in works of its greatest master, Michelangelo; but these qualities afterward degenerated into a mannered imitation, and later into the extravagances of the Baroque.

The sculpture of France in the fifteenth century was at first influenced by that of Flanders, but the native style soon became transformed by Italian grace and beauty. Even the Baroque of the seventeenth century here exhibits a certain classical restraint. During the eighteenth exaggerated form gave place to the more delicate and decorative treatment of the Rococo, which excelled especially in statuettes. A fine, healthy realism ultimately prevailed. In Germany, Gothic forms lingered throughout the

fifteenth century, and when, during the sixteenth, the Italian influence arrived, it was less important than in other countries and confined to the South. A native naturalistic art dominated the Netherlands during the fifteenth century, but, in the seventeenth, the Italian Baroque entered, and, in the eighteenth, sculpture declined. A similar development occurred in Spain, where wood sculpture found great employment in altars, retables, reredoses. Its apogee was a realistic reaction in the seventeenth century, with centre at Seville. See Section *The Renaissance*, under SCULPTURE.

##### 1. *Italy:*

###### (a) Florence:

Ghiberti, Lorenzo  
Donatello  
Michelozzi  
Robbia, Luca della  
Verrocchio, Andrea del  
Pollaiuolo, Antonio  
Desiderio da Settignano  
Rossellini  
Benedetto da Maiano  
Mino da Fiesole  
Civitate, Matteo  
Sansovino, Andrea  
Michelangelo  
Cellini, Benvenuto  
Boulogne, Jean

###### (b) Other Cities:

Quercia, Jacopo della  
Mazzoni, Guido  
Solari, Cristoforo  
Lombardi, Pietro  
Leopardi, Alessandro  
Sansovino, Jacopo  
Leoni, Leone  
Bernini, Giovanni Lorenzo  
Algardi, Alessandro

2. *France:*

Colombe, Michel  
 Goujon, Jean  
 Pilon, Germain  
 Puget, Pierre  
 Coyzevox, Antoine  
 Girardon, François  
 Pajou, Augustin  
 Pigalle, Jean Baptiste  
 Falconnet, Etienne  
 Michel, Claude (Clodion)  
 Houdon, Jean Antoine

3. *Germany:*

Wohlgemuth, Michel  
 Stoss, Veit  
 Krafft, Adam  
 Vischer, Peter  
 Riemenschneider, Tilman  
 Sürlyn, Jörz  
 Schlüter, Andreas  
 Donner, Raphael

4. *Other European Countries:*

Sluter, Claus  
 Duquesnoy, François  
 Quellinus, Artus  
 Berruguete, Alfonso  
 Montañés, Martinez  
 Cano, Alonzo  
 Gibbons, Grinling

## V. MODERN SCULPTURE.

The reaction upon the extravagances of Baroque sculpture, at the close of the eighteenth century, took the form of a return to classic simplicity, and the antique was imitated more closely than ever before. In France, this classicism was followed by a Romantic tendency, corresponding to a similar movement in painting, and by a more important naturalistic reaction. In the second half of the nineteenth

century, classicism and naturalism ran parallel, with an increasing influence of the latter, which now prevails. England had a similar classical period, and a subsequent transition to naturalism; but since 1870 a great change, both in conception and treatment, has come over English sculpture chiefly through the effort of great English painters and the French influence. The German reaction against classicism resulted in the historical school of Berlin, whose work tended toward naturalism, and in the romantic school of Munich; not until the end of the nineteenth century did naturalism prevail. In other European countries the development has been similar to that general evolution described above. After some ineffectual early attempts, America also had its classical school, with a number of important artists. Since the last quarter of the nineteenth century the tendency has been entirely naturalistic, and an array of talent has appeared which compares favorably with that of other countries. See:

1. *France:*

Pradier, James  
 David d'Angers  
 Rude, François  
 Barye, Antoine Louis  
 Chapu, Henri Michel  
 Dubois, Paul  
 Mercié, Antonin  
 Barrias, Ernest  
 Bartholdi, Frédéric  
 Carpeaux, Jean Baptiste  
 Frémiet, Emmanuel  
 Dalou, Jules  
 Rodin, Auguste  
 Bartholomé, Paul Albert

*2. England:*

Flaxman, John  
Westmacott, Richard  
Gibson, John  
Stevens, Alfred  
Foley, John Henry  
Woolner, Thomas  
Watts, George Frederick  
Thornycroft, Hamo  
Brock, Sir Thomas  
Ford, Edward Onslow  
Gilbert, Alfred  
Frampton, Sir George  
Epstein, Jacob

*3. Germany:*

Dannecker, Johann Heinrich  
Schadow, Johann Gottfried  
Rauch, Christian  
Hähnel, Ernst  
Rietschel, Ernst  
Schilling, Johannes  
Schwanthaler, Ludwig  
Begas, Reinhold  
Stuck, Franz  
Klinger, Max  
Zumbusch, Kaspar  
Tilgner, Viktor  
Strasser, Arthur  
Tuaillon, Louis

*4. Other European Countries:*

Canova, Antonio  
Thorvaldsen, Bertel  
Tenerani, Pietro  
Marchesi, Pompeo  
Dupré, Giovanni  
Ximenes, Ettore  
Sergel, Johan Tobias  
Sinding, Stefan  
Antokolski, Mark  
Troubetzkoi, Prince Paul

*5. United States:**(a) Classicists:*

Greenough, Horatio  
Powers, Hiram  
Crawford, Thomas  
Story, William Wetmore  
Rogers, Randolph  
Rogers, John  
Rinehart, William Henry  
Hosmer, Harriet

*(b) Early Naturalists:*

Palmer, Erastus Dow  
Mills, Clark  
Ball, Thomas  
Brown, Henry Kirke  
Ward, J. Q. A.  
Keyser, Ephraim

*(c) Naturalism Under French Influence:*

Warner, Olin Levi  
Saint Gaudens, Augustus  
French, Daniel Chester  
Macmonnies, Frederick  
Bitter, Karl  
Niehaus, Charles Henry  
Partridge, William Ordway  
Dallin, Cyrus Edwin  
Proctor, A. Phimister  
Kemeys, Edward  
Bartlett, Paul  
Barnard, George Grey  
Borglum, Gutzon  
Borglum, Solon H.  
Platt, Bela Lyon  
Grafty, Charles  
Calder, Alexander S.  
Taft, Lorado  
Tilden, Douglas  
Aitkin, Robert I.  
Vonnoh, Bessie Potter

## B. Painting

A series of special articles treats the technical side of painting, the different varieties, the painter's implements, and the qualities by which a picture should be judged. The history of the different schools is comprehensively described under PAINTING. This article should form the basis of the study of any given school; it should, however, be supplemented by the articles on separate schools and the biographies of the artists, of which only the principal are contained in the following lists.

### I. TECHNIQUE AND ALLIED ARTS.

#### 1. *Varieties:*

- Mural Decoration
- Genre Painting
- Portraiture
- Landscape
- Still Life

#### 2. *Technical Processes:*

- Fresco
- Tempera
- Oil Painting
- Pastel
- Water-Color Painting
- Encaustic Painting
- Stereochromy

#### 3. *Implements:*

- Canvas
- Easel
- Mahlstick
- Ground
- Painters' Colors

#### 4. *Technical Qualities:*

- Drawing
- Line
- Perspective
- Chiaroscuro

Color

Composition

Proportion

#### 5. *Analogous Arts:*

Mosaic

Stained Glass

Decorative Art

Sgraffito

### II. GREEK PAINTING.

The decorative painting of Oriental countries is treated under the different titles of the subdivision Oriental Art, in the introductory section of the preceding chapter. Greek painting was the first to rise to the dignity of an independent art. The transition from the painting of Cretan and Mycenæan decorations, which show considerable technical skill and a high power of invention, to that of the fifth century B. C. can be studied only in vase-painting (see VASE). In the fifth and fourth centuries B. C., Greek painting attained its highest development. The older Attic School, with Polygnotus as its founder and Athens as a centre, brought the art to a high state of development in the years following the Persian wars. Its decorative work was practically great, colored, outline drawings, noble in composition and expression. Perspective and shading were discovered by Agatharchus of Samos, a scene painter, and applied to panel-painting by Apollodorus of Athens. In the later fifth century flourished the Ionian School of Zeuxis and Parrhasius, which substituted realism for the old idealism and excelled in delicate drawing and chiaroscuro.

In the early fourth century, the centre of painting shifted to Sicily, where systematic drawing and chiaroscuro were further developed, and the process of encaustic painting was invented. The Theban-Attic School (second half of the fourth century) was devoted to impassioned subjects, like battle pieces, and even to genre, and the highest technical perfection was achieved by the younger Ionian School in the persons of Apelles and Protogenes. In the Hellenistic age painting increased the range of its expression, including even the landscape, but it declined in artistic quality. The decorative and less important painting of the Roman epoch is treated under ROMAN ART. See:

#### 1. *General References:*

Section *Painting* under Greek  
Art and Roman Art  
Vase

#### 2. *Greek Painters:*

Polygnotus  
Micon  
Agatharchus  
Apollodorus  
Zeuxis  
Parrhasius  
Pamphilus  
Pausias  
Apelles  
Protogenes  
Aldobrandini Marriage

### III. MEDIEVAL PERIOD.

The origins of Mediæval painting were conditioned by the Mosaic style, as it prevailed in Early Christian and Byzantine art. Its growth was dependent upon the development of architecture in Church worship, and it con-

sequently remained decorative. At the close of the Gothic period, the emancipation of painting began in Italy, and individual artists arose. The chief centres were Florence, where Giotto founded a powerful school of mural painting, and Siena, which developed panel painting under strong Byzantine influence. See:

Mosaic  
Christian Art  
Byzantine Art  
Romanesque Art  
Gothic Art  
Florentine School of Painting  
Sienese School of Painting  
Cavallini, Pietro  
Cimabue  
Giotto  
Gaddi, Taddeo  
Orcagna, Andrea  
Aretino, Spinello  
Duccio di Boninsegna  
Martini, Simone  
Lorenzetti  
Gentile da Fabriano  
Lorenzo, Don

### IV. THE RENAISSANCE.

Naturalism dominated the painting of the Early Renaissance in Italy, the classic influence appearing only in the decorative motifs. Our study begins with Florence, where the great technical problems were solved for future painting. The High Renaissance combined the achievements of the Early with a profounder knowledge of the Antique. The Florentine school ranked highest in everything but color, in which the Venetians excelled, as did the Umbrians in religious sentiment. In Northern Europe the Renaissance, entirely naturalistic in character, but

Gothic in sentiment, first appeared in Flanders, whence its influence extended to Holland and Germany. Later the Italian influence transformed for the worse the art of the Netherlands, but aided to produce a national school in Germany. See:

### 1. *Italy.*

#### (a) General Titles:

Renaissance Art

Section *The Renaissance* under Painting

Florentine School of Painting

Umbrian School of Painting

Bolognese School of Painting

Ferrarese School of Painting

Venetian School of Painting

#### (b) Biography:

##### (i) Florence:

Masolino da Panicale

Angelico, Fra

Masaccio

Uccello, Paolo

Castagno, Andrea del

Lippi, Filippo and Filippino

Botticelli, Sandro

Gozzoli, Benozzo

Pollaiuolo, Antonio

Verrocchio, Andrea

Ghirlandaio, Domenico

Vinci, Leonardo da

Michelangelo

Bartolommeo, Fra

Sarto, Andrea del

Bronzino, Agnolo

##### (ii) Umbria:

Francesca, Piero della

Melozzo da Forlì

Santi, Giovanni

Signorelli, Luca

Perugino, Pietro

Pinturicchio

Raphael

##### (iii) Northern Italy:

Squarcione, Francesco

Mantegna, Andrea

Tura, Cosimo

Costa, Lorenzo

Francia, Francesco

Viti, Timoteo

Dosso Dossi

Garofalo

Correggio

Sodoma

Pisanello

Foppa, Vincenzo

Borgognone

Predis, Ambrogio da

Solario, Andrea

Luini, Bernardino

Ferrari, Gaudenzio

##### (iv) Venice:

Vivarini

Crivelli, Carlo

Antonello da Messina

Bellini (family)

Carpaccio, Vittore

Giorgione

Titian

Bonifazio Veronese

Lotto, Lorenzo

Tintoretto

Veronese, Paolo

Bassano

Moretto da Brescia

Moroni, Giambattista

##### (v) Rome:

Sebastiano del Piombo

Volterra, Daniele da

Pippi, Giulio (called Romano)

### 2. *The Netherlands:*

Netherlands Schools of Painting

Eyck, Huybrecht and Jan van

Weyden, Rogier van der

Bouts, Dierick

Hugo van der Goes  
 Memling, Hans  
 David, Gerard  
 Matsys, Quinten  
 Orley, Bernaert van  
 Mabuse, Jan  
 Lucas van Leyden  
 Bosch, Hieronymus

### 3. *Germany:*

Lochner, Stephan  
 Schongauer, Martin  
 Wohlgemuth, Michel  
 Dürer, Albrecht  
 Burckmair, Hans  
 Cranach, Lucas  
 Holbein the Elder  
 Holbein the Younger  
 Grünewald, Matthias  
 Baldung, Hans

### 4. *France and Spain:*

Fouquet, Jehan  
 Clouet  
 Cousin, Jean  
 Coello, Alonzo  
 Morales  
 Theotocopuli (called El Greco)

## V. SEVENTEENTH AND EIGHTEENTH CENTURIES.

The seventeenth century saw the rise of the Eclectic and Naturalist schools in Italy, and of a courtly art, based upon the classic, in France, whose artists in Italy also perfected the classic landscape. It was the golden age of painting in Spain, Flanders and Holland. Spain developed a great religious art, combining Catholic devotion with a trenchant realism, and a marvelous portraitist in Velazquez. The Flemish School was also realistic, but more influenced by Italy, and less religious in character. In Holland, a

highly developed national realism, practically uninfluenced from without, found expression in panels of portrait, genre, landscape, animal, and still life. The eighteenth century witnessed in France the light, graceful and decorative painting of the Rococo, and the rise in England of a bourgeoisie art, showing a curious admixture of Eclectic Italian influence with realism, and foreshadowing that of the nineteenth century. See Section *Seventeenth and Eighteenth Centuries* in the article on PAINTING.

### 1. *Italy:*

Bolognese School of Painting  
 Carracci  
 Domenichino  
 Reni, Guido  
 Guercino  
 Dolci, Carlo  
 Caravaggio  
 Rosa, Salvator  
 Giordano, Luca  
 Tiepolo  
 Canaletto  
 Guardi, Francesco  
 Carriera, Rosalba

### 2. *France:*

Poussin, Nicolas  
 Gelée, Claude (Claude Lorrain)  
 Lebrun, Charles  
 Mignard, Pierre  
 Champagne, Philippe de  
 Watteau, Antoine  
 Fragonard, Jean Honoré  
 Chardin, Jean Siméon  
 Lancret, Nicolas  
 Boucher, François  
 La Tour, Maurice  
 Quentin  
 Greuze, Jean Baptiste  
 Vigée-Lebrun



3. *Spain*:

Herrera the Elder  
 Ribera, Jusepe  
 Velazquez  
 Zurbaran  
 Cano, Alonzo  
 Coello, Claudio  
 Murillo  
 Goya y Lucientes

4. *Flanders*:

Rubens, Peter Paul  
 Van Dyck, Anthonis  
 Jordaens, Jacob  
 Snyders, Frans  
 Fyt, Jan  
 Teniers the Younger  
 Brouwer, Adriaen

5. *Holland*:(a) *Portraiture* (q. v.):

Mierevelt, Michiel  
 Hals, Frans  
 Rembrandt  
 Maes, Nicolas  
 Helst, Bartholomeus van der

(b) *Genre* (q. v.):

Ostade, Adriaen van  
 Dou, Gerard  
 Steen, Jan  
 Terborch, Gerard  
 Metzu, Gabriael  
 Hooch, Pieter de  
 Vermeer van Delft

(c) *Landscape* (q. v.), etc.:

Goyen, Jan van  
 Ruysdael, Salomon  
 Neer, Aert van der  
 Ruisdael, Jacob  
 Hobbema, Meindert  
 Potter, Paulus  
 Velde, Adriaen van de  
 Cuyp, Albert  
 Backhuysen, Ludolf

Velde, Willem van de, the  
 Younger

Heem, Jan de  
 Huysum, Jan van  
 Beyeren, Abraham van  
 David, Gerard  
 Weenix, Jan  
 Hondecoeter, Melchior

6. *England*:

Lely, Sir Peter  
 Kneller, Sir Godfrey  
 Hogarth, William  
 Reynolds, Joshua  
 Gainsborough, Thomas  
 Romney, George  
 Wilson, Richard  
 Morland, George

## VI. MODERN PAINTING.

1. *France*.

During the nineteenth century the hegemony of Europe in the fine arts belonged to France. Rococo art was succeeded in the last part of the eighteenth century by Classicism, which found the chief beauty of painting in form, as revealed in ancient sculpture. The reaction upon Classicism was Romanticism (from c. 1830), which used painting as an expression of the artist's emotional nature, and placed the chief emphasis upon color and natural truth. The Barbizon School represents the emotional impulse of Romanticism, as applied to landscape, animal painting, and peasant subjects. The third great factor in French painting is Realism, advocating the abolition of academic law and sentiment, and the exact presentation of natural truth. Then came Impressionism (1874), so called from a tendency to render momentary impressions, but which sought,

above all, to paint evanescent effects of light. Post Impressionism is a reaction on both Impressionism and Realism, which endeavors to paint pure feeling in purely abstract form and color. See:

(a) Classicists:

David, Jacques Louis  
Prudhon, Pierre  
Gros, Antoine Jean  
Ingres, Jean Auguste Dominique

(b) Romanticists:

Géricault, Jean Louis  
Delacroix, Eugène  
Décamps, Alexandre Gabriel  
Fromentin, Eugène  
Vernet, Horace  
Couture, Thomas  
Regnault, Henri

(c) Eclectics:

Delaroche, Paul  
Bouguereau, Guillaume Adolphe  
Scheffer, Ary

(d) Barbizon Painters:

Corot, Camille  
Rousseau, Théodore  
Dupré, Jules  
Díaz de la Peña  
Daubigny, Charles François  
Millet, Jean François  
Troyon, Constant  
Jacques, Charles  
Cazin, Jean Charles

(e) Realists:

Courbet, Gustave  
Bonnat, Léon  
Duran, Carolus  
Fantin-Latour  
Meissonier, Ernest  
Neuville, Alphonse Marie de  
Détaille, Edouard

(f) Impressionists, etc.:

Impressionist Painting  
Manet, Edouard  
Renoir, August  
Degas, Hilaire Germain  
Raffaelli, Jean François  
Monet, Claude  
Pissaro, Camille  
Sisley, Alfred  
Besnard, Paul Albert

(g) Post Impressionists:

Post Impressionism  
Cézanne, Paul  
Gauguin, Paul  
Matisse, Henri  
Picasso, Pablo  
Picabia, Francis

(h) Various Tendencies:

Flandrin, Jean Hippolyte  
Puvis de Chavannes  
Moreau, Gustave  
Gérôme, Jean Léon  
Vollon, Antoine  
Bonheur, Rosa  
Bastien-Lepage  
Dagnan-Bouveret  
Lhermitte, Léon

2. *Germany (including Austria).*

In Germany the reaction against Classicism first took the form of an imitation of Italian masters of the fifteenth century (Nazarenes). Extensive demand for mural decoration at Munich produced the so-called cartoon (q. v.) style, in which color was neglected. The Düsseldorf School represented the romantic tendencies of German art, chiefly in panel-painting. About 1850 a great change was effected by French and Belgian colorists; since 1870 Realism and since 1880 Impressionism have found entrance. The

most recent tendencies have been very radical (see **SECESSION**) and decorative in character, especially in Vienna. See:

**Pre-Raphaelites**

Düsseldorf School of Painting

Mengs, Raphael

Kauffmann, Angelica

Overbeck, Johann Friedrich

Cornelius, Peter von

Kaulbach, Wilhelm von

Rethel, Alfred

Schwind, Moritz von

Feuerbach, Anselm

Makart, Hans

Max, Gabriel

Munkácsy, Michael

Knaus, Ludwig

Defregger, Franz von

Grützner, Eduard

Menzel, Adolf

Lenbach, Franz

Leibl, Wilhelm

Böcklin, Arnold

Liebermann, Max

Klinger, Max

Thoma, Hans

Uhde, Fritz von

Gebhard, Eduard

Kampf, Arthur

Zügel, Heinrich

Stuck, Franz

**3. Great Britain.**

The chief aim of British art during the early nineteenth century was historical pictures of an academic order. Landscape painting culminated in Turner and Constable. A reaction against the academic came about through the Pre-Raphaelites (q. v.), who introduced spiritual and realistic elements. The chief influence in recent years has been French. See:

Raeburn, Sir Henry

Lawrence, Sir Thomas

Hoppner, John

Haydon, Benjamin Robert

Eastlake, Sir Charles

Blake, William

Wilkie, David

Turner, J. M. W.

Crome, John

Constable, John

Rossetti, Dante Gabriel

Hunt, William Holman

Burne-Jones, Sir Edward

Millais, Sir John Everett

Watts, George Frederick

Herkomer, Hubert

Leighton, Frederick, Lord

Alma-Tadema, Lawrence

Orchardson, W. Q.

Lavery, John

Hornell, Edward

Shannon, James J.

**4. Other Countries.**

In other European countries the development through the Classical, Romantic, and Naturalistic stages was not dissimilar to those already described. All have profited by French technical methods, and are, to a greater or less extent, swayed by Realistic and Impressionistic tendencies. See:

**(a) Belgian and Dutch:**

Gallait, Louis

Leys, Baron Hendrik

Wiertz, Antoine Joseph

Stevens, Alfred

Lempeols, Jeff

Khnopff, Fernand

Israels, Josef

Mesdag, Hendrik

Mauve, Anton

Maris, The Brothers

Gogh, Vincent van  
Toorup, Jan

(b) Scandinavian and Russian:

Zorn, Anders  
Larsson, Carl  
Liljefors, Bruno  
Kroyer, Peter Severin  
Thaulow, Frits  
Vereshtchagin, Vassili  
Repin, Ilia Yefimovitch

(c) Spanish, etc.:

Fortuny, Mariano  
Sorolla, Joaquin  
Segantini, Giovanni

5. *United States.*

During the Colonial period and immediately after the Revolution, British influences prevailed in the United States, with an inclination to follow the Italians in larger subjects. An indigenous art began with the self-taught Hudson River School, about 1825. Then came the foreign influence, and, since 1875, French methods have been quite generally adopted, the natural characteristics revealing themselves in choice of subject and conceptions.

(a) Early Period:

West, Benjamin  
Copley, John Singleton  
Peale, Charles Wilson  
Trumbull, John  
Stuart, Gilbert  
Allston, Washington  
Peale, Rembrandt  
Sully, Thomas  
Jarves, John Wesley

(b) Middle Period:

Hudson River School of Painting  
Cole, Thomas  
Durand, Asher Brown

Kensett, John Frederick  
Church, Frederick Edwin  
Bierstadt, Albert  
Moran, Thomas  
Harding, Chester  
Neagle, John  
Inman, Henry  
Huntington, Daniel  
Fuller, George  
Ryder, Albert P.  
Johnson, Eastman  
Brown, John G.  
Mount, William Sidney  
Leutze, Emanuel  
Hicks, Thomas  
Hunt, William Morris  
Homer, Winslow  
Inness, George  
Wyant, A. H.  
Martin, Homer D.

(c) Third, or Cosmopolitan, Period:

(i) Figure and Portrait:

Whistler, James Abbott Mc-  
Neil  
Abbey, Edwin A.  
Sargent, John Singer  
Vedder, Elihu  
Duvenceck, Frank  
Dielman, Frederick  
Chase, William Merrit  
Eaton, Wyatt  
Weir, James Alden  
Thayer, Abbott  
Brush, George De Forest  
Tarbell, Edmund  
Benson, Frank Weston  
Dewing, Thomas W.  
Blum, Robert F.  
Walker, Horatio  
Remington, Frederick  
Couse, E. Irving  
Wiles, Irving  
Alexander, John W.

Decamp, Joseph R.  
 Eakins, Thomas  
 Beaux, Cecilia  
 Harrison, (Thomas) Alexander  
 Melchers, Gari  
 Cassatt, Mary

(ii) Landscape:

Dewey, Charles Melville  
 Blakelock, Ralph  
 Dearth, Henry Golden  
 Wiggins, Carlton  
 Robinson, Theodore  
 Bunce, William Gedney  
 Murphy, John Francis  
 Crane, Bruce  
 Harrison, (Lovell) Birge  
 Twachtman, John Henry  
 Dougherty, Paul  
 Hassam, Childe  
 Foster, Ben  
 Schofield, W. Elmer  
 Redfield, Edward Willis  
 Symons, Gardner  
 Chapman, Carlton T.  
 Waugh, Frederick Judd  
 Carlsen, Emil

(iii) Mural Painting (q. v.):

La Farge, John

Cox, Kenyon  
 Blashfield, Edwin H.  
 Mowbray, Henry Siddons  
 Rogers, H. O.  
 Millet, Frank D.  
 Oakley, Violet

(iv) Recent Tendencies:

Henri, Robert  
 Bellows, George  
 Lie, Jonas  
 Lawson, Ernest  
 Mora, Luis  
 Hawthorne, Charles W.  
 Miller, Richard E.  
 Friesecke, Frederick Carl  
 Dabo, Léon

VI. PASTEL, WATER-COLOR, AND MINIATURE PAINTING.

The basis of study should be the general articles on these three varieties of painting, which discuss their technique and history and enumerate the principal artists. The most important of the latter are treated as special titles, to which reference should be made.

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## Chapter 12. The Minor Arts

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### A. Engraving

Engraving is the art of producing on a hard surface, such as stone, metal, or wood, incised or relief designs. These may be for purposes of decoration, as in the case of engraved bronzes and silverware, or for stamping a soft substance, as seal rings. But engravings are usually made for the purpose of printing upon paper, and it is this variety with which we are chiefly concerned.

Printing is done either from incised designs to which the ink is applied, or from relief designs, which thus produce the image. In the first process, metal plates, usually of copper, are used; the principal varieties are Line-Engraving and Etching, to which may be added Dry Point, *Manière Criblée*, and Stipple. The chief form of Engraving in relief is Wood-Engraving; and there are mixed processes, like Aquatint, Mezzotint, and Soft-Ground Etching. The trial impressions upon paper are called the proofs, and the final result the print. The article ENGRAVING contains a general sketch of the subject. See also:

Line Engraving  
Etching  
Dry Point  
*Manière Criblée*  
Stipple  
Wood Engraving  
Aquatint  
Mezzotint  
Soft-Ground Etching  
Print Proof

#### I. LINE ENGRAVING.

Line Engraving is done with the burin, usually upon a copper plate. It

originated simultaneously in Italy and Germany during the early fifteenth century, probably with the goldsmiths, from the custom of printing trial impressions of niello plates. (See NIELLO.) The earliest line-engravings are mere outline drawings without light or shade. In the early sixteenth century, the art culminated in the works of Albrecht Dürer in Germany, Lucas van Leyden in Holland, and Marcantonio Raimondi in Italy. During the seventeenth century, especially under Louis XIV, France was predominant. But artists devoted themselves increasingly to the reproduction of great paintings instead of original designs. For this reason, the art has gradually sunk into disuse, its place being taken by photographic processes. See:

Line-Engraving (basis of study)  
Burin  
Niello

#### 1. Italy:

Finiguerra, Tomaso  
Jacopo dei Barbari  
Mantegna, Andrea  
Raimondi, Marcantonio  
Carracci, Agostino  
Piranesi, Giambattista  
Morghen, Raffaello

#### 2. Germany; Netherlands:

Schongauer, Martin  
Dürer, Albrecht  
Lucas van Leyden  
Beham, Hans Sebald  
Beham, Barthel  
Vorsterman, Lucas  
Chodowiecki, Daniel

3. *England:*

Strange, Sir Robert  
Vertue, George

4. *France:*

Bosse, Abraham  
Nanteuil, Robert  
Masson, Antoine  
Audran, Gérard  
Cochin, Charles Nicolas  
Forster, François  
Henriquel-Dupont, Louis Pierre  
Gaillard, Claude Ferdinand

## II. ETCHING.

In etching, the plate is covered with the ground, usually a varnish, into which the design is scratched with an etching-needle. The plate is then immersed in an acid, which eats the design into the metal. The finishing touches are often done by the dry-point process, a simple scratching of the plate without the use of ground or acid.

Etching upon steel armor, etc., was practiced in the Middle Ages. Dürer was one of the first to use etching for printing purposes, and the art reached its highest development in Holland during the seventeenth century. Many eminent painters practiced it, among whom was the greatest etcher of all times, Rembrandt. Next to Holland, etching was principally cultivated in France, beginning with Claude Lorrain's landscapes. The art found a revival in the nineteenth century, especially in France, but also in England, Germany, and the United States. The following list cites only the principal etchers and a few of the important painters who have practiced etching. See *Etching* (basis of study):

1. *Netherlands:*

Lucas van Leyden  
Velde, Esaias van de  
Rembrandt  
Ruisdael, Jacob  
Potter, Paul  
Van Dyck, Anthonis

2. *France:*

Gelée, Claude (Claude Lorrain)  
Flameng, Leopold  
Rajon, Paul  
Méryon, Charles  
Jacquemart, Jules Ferdinand  
Legros, Alphonse  
Helleu, Paul

3. *Germany:*

Hollar, Wenzeslas  
Unger, William  
Klinger, Max  
Thoma, Hans  
Liebermann, Max

4. *Spain:*

Goya, Francisco

5. *England:*

Geddes, Andrew  
Wilkie, Sir David  
Turner, J. M. W.  
Hamerton, Philip Gilbert  
Haden, Francis Seymour  
Menpes, Mortimer  
Brangwyn, Frank

6. *United States:*

Whistler, James Abbott McNeil  
Pennell, Joseph  
Moran  
Parish, Stephen  
Platt, Charles A.  
Webster, Herman A.

## III. WOOD ENGRAVING.

In early Wood Engraving, the design, and the early wood engraving at-

block, and all the wood was cut away except the design, which remains in relief. The process is of peculiar importance because it can be used in connection with printing from movable types.

Crude outline prints from wood-cuts were common in Southern Germany and the Netherlands in the early fifteenth century. The art received an impetus from the invention of printing, and the early wood-engraving attained its most perfect development during the early sixteenth century in the works of Albrecht Dürer and Hans Holbein in Germany. It was introduced by German artists into Italy; but here only the chiaroscuro process attained a high degree of proficiency. (See paragraph *Chiaroscuro* under WOOD ENGRAVING.) Wood engraving flourished also in the Netherlands and in France.

Modern wood engraving is done on the cross-grain of boxwood, and with a graver instead of the knife. The design is cut away instead of being left in relief, appearing in white lines. The father of the art was the Englishman, Thomas Bewick (died in 1828), although his pupils achieved much as book illustrators. The art has, during late years, succumbed in England to the more accurate photographic processes. Present German wood engraving is, generally speaking, precise and careful in execution; but the French school has attained the highest artistic perfection.

Before the Civil War, America produced several prominent wood engravers whose work resembled contemporary British. But after 1870, in connection with the popular magazines, a

school, headed by Timothy Cole, arose which reproduced the effect of paintings, drawings, etc., with remarkable fidelity, and used the technical proficiency acquired to render portraits and landscapes. Since the perfection of the photographic processes, wood engravers have returned to a more legitimate practice of their art wood engraving. See:

1. *Germany*:

Dürer, Albrecht  
 Burckmair, Hans  
 Schüffelein, Hans  
 Holbein the Younger  
 Lützelburger, Hans  
 Cranach, Lucas  
 Altdorfer, Albrecht  
 Beham, Hans Sebald  
 Aldegrever, Heinrich  
 Baldung, Hans  
 Menzel, Adolf  
 Richter, Ludwig

2. *France*:

Cousin, Jean  
 Charpentier, François  
 Bracquemond, Joseph Auguste  
 Jannot, Tony  
 Grandville  
 Gavarni  
 Doré, Gustave

3. *Italy*:

Carpi, Ugo da  
 Andreani, Andrea

4. *England*:

Bewick, Thomas  
 Blake, William  
 Linton, William James

5. *United States*:

Anderson, Alexander  
 Smillie, James D.



Danforth, Moseley Isaac  
 Cole, Timothy  
 Juengling, Frederick  
 Kruell, Gustav  
 Wolf, Henry

#### IV. LITHOGRAPHY.

In lithographic processes, the design is drawn with crayon or fatty ink upon a porous stone or metal, possessing the property of retaining fatty substances and water to the evaporating point. The remainder of the stone is moistened with water. A roller covered with fatty printing ink will retain only the design, being repelled by the moist portions. Lithography was invented in 1798, by Aloys Senefelder, at Munich. Since the invention of the power press, it has become a world-wide industry. See:

Lithography  
 Senefelder, Aloys  
 Whistler, James Abbott McNeil  
 Pennell, Joseph

The principal artists cited under  
**LITHOGRAPHY.**

#### V. PHOTO-ENGRAVING.

This is a mechanical process in which the plates are prepared from a photographic negative by means of the action of light upon gelatine and other substances. It may be intaglio, in which the French name photogravure is used, or relief. The finishing touches are done by hand. The half-tone process, now generally used for purposes of illustration, is done on plates of ruled lines of extreme fineness. See **PHOTO-ENGRAVING.**

#### VI. ILLUSTRATION.

The article **ILLUSTRATION** treats the decoration and illustration of books,

and its history from the Egyptian papyri to the modern newspaper. This should be supplemented by **ILLUMINATED MANUSCRIPTS**, treating especially the Middle Ages and Renaissance. With the invention of printing, wood engraving (q. v.) became the principal means of illustration. Since 1850 photo-engravings have been increasingly used, and, in recent years, colored illustrations, some of great beauty, have been produced, especially in the leading magazines. The article **CARICATURE** describes in detail the important influence of that factor of illustration. The principal illustrators are enumerated there, under **WOOD-ENGRAVING**, and in the list subjoined.

##### 1. *France:*

Callot, Jacques  
 Daumier, Honoré  
 Gavarni  
 Cham  
 Caran d'Ache  
 Forain, Jean Louis  
 Willette, Léon Ad phe

##### 2. *England:*

Gilray, James  
 Cruikshank, George  
 Doyle, John  
 Leech, John  
 May, Phil  
 Du Maurier, George  
 Tenniel, Sir John  
 Crane, Walter  
 Beardsley, Aubrey Vincent

##### 3. *United States:*

Nast, Thomas  
 Gibson, Charles Dana  
 Christy, Howard Chanler  
 Fisher, Harrison  
 Flagg, James Montgomery

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## Chapter 13. Music

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**T**O appreciate music requires chiefly a receptive temperament. Obviously, the more one understands of the technique whereby certain harmonious results are produced, the greater will be the enjoyment of those results. But, irrespective of the critical interest in music, its first appeal must be, and is, to the imagination and the emotions. The layman in the audience is not thrilled by the cold, technical fact that the violinist, yonder on the stage, is producing that wonderfully soft, birdlike note by the infinitesimal, *even* pressure of his little finger on the highest possible note of the A string. The musicians, the violinists, the critics, realize the years of study that have contributed to the production of that perfect note, and their admiration is greater, but their enjoyment of the emotional result is no more keen, than that of the musical proselyte beside them.

This theory, which is based on actualities, finds its logical expression in the system that has been adopted in outlining the department of Music in the *New International Encyclopædia*. There is, first, a synopsis of the articles which would interest the general reader by giving an historical and appreciative résumé of music as an art. The second subdivision is more especially for the student, or for the reader who desires to master the technique and science of music, in order that he may "see with an understanding eye" and hear with a critical nicety of discrimination.

### 1. INTRODUCTORY.

Music  
Music, History of  
Sacred Music  
Opera (with the accompanying  
lists of operas)  
Oratorio (with the accompany-  
ing list of oratorios)  
Instrumental Music  
Musical Instruments (with cross  
references to individual arti-  
cles or instruments, under  
their own names)  
Orchestra  
Score  
Band  
Band, Military  
Organ  
Pianoforte  
Violin  
Singing

Dancing (with cross references  
to separate articles)

### 2. HISTORICAL.

Folk-Music  
Egyptian Music  
Hindu Music  
Chinese Music  
Japanese Music  
Hebrew Music  
Greek Music  
Magyar Music  
Arabian Music  
Scandinavian Music  
Slavonic Music  
Spanish Music  
Janizary Music  
Celtic Music  
Finnish Music  
Scotch Music  
Indian Music  
Negro Melodies

Minnesinger  
 Troubadours  
 Trouvère  
 Waits  
 Ambrosian Chant  
 Gregorian Chant  
 Hymnology  
 National Hymns

### 3. MUSICAL ORGANIZATIONS, ETC.

Guilds, Musical (under Guild)  
 Conservatory  
 Conductor  
 Precentor  
 Musical Festival  
 Gesellschaft der Musikfreunde  
 Gewandhaus-Concerte  
 Leeds Musical Festival  
 Choral Societies  
 Handel and Haydn Society  
 Oratorio Society  
 Singakademie  
 Philharmonic Societies  
 Boston Symphony Orchestra  
 Société des Concerts du Conservatoire  
 Sons of the Clergy Musical Festival  
 Chicago Symphony Orchestra  
 Cincinnati Symphony Orchestra  
 Minneapolis Symphony Orchestra  
 Three Choirs Festival  
 Bethlehem, Musical or Bach Festival  
 Worcester Musical Festival  
 Peterboro Musical Festival  
 Bayreuth Musical Festival

### 4. THE ART-FORMS.

Canon  
 Cantata  
 Catch  
 Chaconne

Chamber Music  
 Chant  
 Chorale  
 Concerto  
 Cyclical Forms  
 Duet  
 Étude  
 Fantasia  
 Form  
 Fugue  
 Glee  
 Humoreske  
 Imitation  
 Incidental Music  
 Interlude  
 Intermezzo  
 Introduction  
 Legend  
 Leitmotiv  
 Lied  
 Musical Drama  
 Nocturne  
 Offertory  
 Overture  
 Paraphrase  
 Passion  
 Pasticcio  
 Postlude  
 Pot-pourri  
 Prelude  
 Programme Music  
 Quartet  
 Recitative  
 Requiem  
 Rhapsody  
 Rondo  
 Scherzo  
 Serenade  
 Singspiel  
 Solo  
 Sonata  
 Song  
 Suite  
 Symphonic Poem

Symphony

Trio

Variation

Virginal

Transposing Instruments

Valves in Musical Instruments  
(under Valve)

Voice

See also PIANO, ORGAN, SINGING,  
and MUSICAL INSTRUMENTS.

## 5. DEFINITIONS AND DESCRIPTIONS OF TERMS AND PROCESSES USED IN THE INTERPRETATION OF MUSIC.

Musical Dictation

Beat

Baton

Rest

Tempo

Temperament

Rhythm

Syncopation

Expression

Musical Notation

Modulation

Intonation

Fingering

Position

Touch

Phrasing

Slide

Swell

Register

Augmentation

Movement

Passing Notes

Tremolo

Trill

Treble

Bass

Neumes

Value

Clang Tint, Explanation of

Finger-board

Clavichord

Janko Keyboard

Harpsichord

Manual

Metronome

Pedal

String

## 6. MISCELLANEOUS AND TECHNICAL ARTICLES.

The reader who has followed the course outlined in the earlier subdivisions, will find that the following articles are mainly specialized statements of general principles with which he is already familiar:

### HARMONY :

Antiphony

Bar

Cadence

Cantus Firmus

Chord

Chromatic

Clef

Coda

Consonance

Degree

Diatonic Scale

Diazeutic Tone

Discord

Dissonance

Dominant

Figured Bass

Finale

Flat

Fundamental Note

Grace-notes

Guidonian Hand

Harmonics

Homophony

Improvisation

Instrumentation

Interval

Invention  
 Inversion  
 Key  
 Leading Tone  
 Leading of Voices  
 Leger-Lines  
 Major  
 Measure  
 Mediant  
 Melody  
 Meloplaste  
 Melos  
 Mensurable Music  
 Metre  
 Minor  
 Mixed Cadence  
 Modes  
 Monody  
 Motion  
 Motive  
 Natural  
 Nuances  
 Numerical Notation  
 Octave  
 Organ-Point  
 Organum  
 Part  
 Part-music  
 Passage  
 Passing Notes  
 Pitch  
 Plain Chant  
 Polyphony  
 Preparation  
 Principal  
 Progression  
 Reed  
 Relationship  
 Scale  
 Semitone  
 Sequence  
 Sharp  
 Solmization  
 Subdominant

Suspension  
 Tablature  
 Theme  
 Tierce  
 Tonality  
 Tone  
 Tonic  
 Tonic Sol-fa  
 Touch  
 Transcription  
 Transposition  
 Triad  
 Triplet  
 Typical Phrase  
 Unison  
 Variation

#### BIOGRAPHY.

A selected list of the world's great composers would include the following names :

Adam, A. C.  
 Agricola, M.  
 d'Albert, E.  
 Allegri, G.  
 Anerio, F.  
 Animuccia, G.  
 Arcadelt, J.  
 Arne, T. A.  
 Auber, D. F. E.  
 Bach, J. S.  
 Bach, K. P.  
 Balfe, M. W.  
 Barnby, J.  
 Beethoven, L.  
 Bellini, V.  
 Benedict, J.  
 Bennett, W. S.  
 Berlioz, H.  
 Bizet, G.  
 Boieldieu, F. A.  
 Bononcini, G. B.  
 Brahms, J.  
 Bruneau, A.

- Bull, J.  
Buxtehude, D.  
Caccini, G.  
Cambert, R.  
Carissimi, G.  
Cavalieri, E.  
Cherubini, M. L.  
Chopin, F. F.  
Cimarosa, D.  
Clementi, M.  
Corelli, A.  
Cornelius, P.  
Couperin, F.  
Cui, C.  
David, F. C.  
Debussy, C.  
Deprès, J.  
Donizetti, G.  
Durante, F.  
Dvorák, A.  
Elgar, E.  
Enna, A.  
Festa, C.  
Field, J.  
Flotow, F.  
Franck, C.  
Franz, R.  
Frescobaldi, G.  
Froberger, J. J.  
Gabrieli, A.  
Gabrieli, G.  
Gade, N. W.  
Gibbons, O.  
Giordano, U.  
Glinka, M. I.  
Gluck, C. W.  
Goldmark, K.  
Gossec, F. J.  
Goudimel, C.  
Gounod, C. F.  
Graun, K. H.  
Grétry, A. E. M.  
Grieg, E.  
Halévy, J. F.  
Handel, G. F.  
Haydn, J.  
Hérold, L. J. F.  
Hiller, J. A.  
Hofhaimer, P.  
Humfrey, P.  
Hummel, J. N.  
Humperdinck, E.  
d'Indy, V.  
Ippolitov-Ivanov, M.  
Isaak, H.  
Isouard, N.  
Jommelli, N.  
Keiser, R.  
Kiel, F.  
Lalo, E.  
Lasso, Orlando di  
Leo, L.  
Leoncavallo, R.  
Le Sueur, J. F.  
Liszt, F.  
Logroscino, N.  
Lortzing, G. A.  
Lotti, A.  
Lully, J. B.  
MacDowell, E. A.  
Mahler, G.  
Marschner, H.  
Mascagni, P.  
Massenet, J. E. F.  
Mendelssohn-Bartholdy, F.  
Meyerbeer, G.  
Monteverde, C.  
Morley, T.  
Mozart, W. A.  
Mussorgsky, M.  
Nanini, G. M.  
Offenbach, J.  
Okeghem  
Pachelbel, J.  
Paisiello, G.  
Palestrina, G. P.  
Pergolesi, G. B.  
Piccini, N.

Ponchielli, A.  
Porpora, N. A.  
Prätorius, M.  
Puccini, G.  
Purcell, H.  
Raff, J.  
Rameau, J. P.  
Reger, M.  
Rimski-Korsakov, N.  
Rossini, G. A.  
Rubinstein, A.  
Sacchini, A. M.  
Saint-Saëns, C. C.  
Scarlatti, A.  
Schubert, F.  
Schumann, R.  
Schütz, H.  
Sibelius, J.  
Sinding, C.  
Smetana, F.  
Spohr, L.  
Spontini, G. L.  
Strauss, J.  
Strauss, R.  
Sullivan, A. S.  
Suppé, F.  
Tchaikovsky, P. I.  
Thomas, A.

Tartini, G.  
Verdi, G.  
Viotti, G. B.  
Volkman, R.  
Wagner, R.  
Wallace, W. V.  
Weber, K. M.  
Willaert, A.  
Wolf, H.  
Zingarelli, N. A.

NOTE—The names of famous operas, oratorios, symphonies, dances, and national hymns have been omitted from the above classification. In the majority of cases, they will be found under their own proper titles, although brief mention of them would also be found in the general articles OPERA, ORATORIO, SYMPHONY, and NATIONAL HYMNS. The same is true of the scores of musical instruments and musical directions whose names will be found under the general articles ABBREVIATIONS, MUSICAL INSTRUMENTS and TEMPO.

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## Chapter 14. Mathematics

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**R**OUGHLY defined, mathematics is the science of forms and number. A few of the definitions given by eminent mathematicians are found in the general article MATHEMATICS, which is, therefore, a suitable introduction to the subject. The article gives a condensed history of mathematics, from earliest times to the present, together with a logical classification of the various branches of mathematics.

Mathematical science naturally falls into two main subdivisions: Pure Mathematics and Applied Mathematics. With this division as a basis, various classifications have been attempted. The best classification for the purpose of systematic reading is the one usually followed in the school curriculum, or in the text-books. In accordance with this, we may subdivide Elementary Mathematics into the following branches:

Arithmetic

Algebra

Geometry

Trigonometry

Analytic Geometry

Calculus

Division

Arithmetic Signs

Fraction

Involution and Evolution

Proportion

Checking in Arithmetic

Calculating Machines

Slide Rule

1. ARITHMETIC involves three phases: The conception of number, the representation of number by symbols, and the principles and methods of computation. A general discussion of these phases, together with their history, is given in the article ARITHMETIC, which, therefore, should be read as an introduction to this branch.

A more modern phase of arithmetic is computation by calculating machines. This process has already to a large extent replaced computations by hand, and seems to be destined to do so even more in the future.

The general articles bearing on this branch may be conveniently read in the following order:

(a) *Principles and Methods of Computation:*

Addition

Subtraction

Multiplication

(b) *Symbols, Representation, and Scales:*

Symbols

Numerals

Decimal System

Scales of Notation

(c) *Theory of Numbers:*

Number

Irrational Number

Complex Number

The detailed history of these topics is given separately in each article.

2. ALGEBRA is universal arithmetic, and has many features in common with arithmetic. The fundamental operations are the same, with the exception that algebra takes up the more general cases. The limitations of algebra are brought out in the general article ALGEBRA, where also a history of this branch is given. Since algebra and



arithmetic are so closely related, the fundamental operations are best treated together, and so the general articles bearing on the fundamental operations in algebra have been given under arithmetic. Those belonging almost exclusively to algebra are best taken up in the following order:

Coefficient  
Factor  
Exponent  
Associative Law  
Polynomial  
Negative Quantity  
Binomial  
Binomial Coefficients  
Binomial Theorem  
Remainder Theorem  
Equation  
Elimination  
Substitution  
Diophantine Analysis  
Series  
False Position, Rule of  
Cubic Equation  
Biquadratic Equations  
Permutations and Combinations  
Probability  
Determinants  
Logarithms  
Analysis

3. GEOMETRY is the science of form, and geometric concepts arise from the consideration of forms of objects just as numerical concepts arise from considering a collection of objects. Geometry is independent of algebra, and may be studied before or after algebra, but preferably after. The physical scientist considers only the space we live in, while the mathematician considers all possible spaces. Accordingly, we have many different kinds of geometry. A general classification and dis-

cussion of the several geometries is given in the article GEOMETRY. Although algebra and geometry are independent, a correspondence may be set up between them. This is brought out in the article CORRESPONDENCE. The general articles are best read in the following order:

Euclid  
Axiom  
Theorem  
Problem  
Corollary  
Angle  
Arithmetic and Geometric Signs  
Equiangular  
Equilateral  
Congruence  
Duality  
Construction  
Locus  
Triangle  
Circle  
Quadrilateral  
Polygon  
Circumscribed and Inscribed Figures  
Contact  
Perimeter  
Transversal  
Antiparallels  
Concurrence and Collinearity  
Maxima and Minima  
Similarity  
Symmetry  
Plane  
Octahedron  
Polyhedron  
Projective Geometry  
Projection  
Homology  
Perspective  
Isoperimetric Figures  
Engineering Instruments  
Surveying

**Planimeter**  
**Mensuration**

**Protractor**

**Vernier**

**Quadrature**

**Weights and Measures**

**Duplication of Cube (under Cube)**

**Quadrature of Circle (under Quadrature)**

**Trisection of an Angle**

4. **TRIGONOMETRY** in elementary mathematics deals with the study of triangles, and the measurement of their sides, angles, and areas. This is, however, only a part of the general subject. Under the article **TRIGONOMETRY**, almost a whole text-book treatment is given, together with a short history of the subject from earliest times. As an introduction, read the article **LOGARITHMS**. An elementary knowledge of algebra and geometry is, however, necessary before the study of trigonometry can be taken up.

5. **ANALYTIC GEOMETRY** is the application of algebra to geometry, and the combination of the two is the most powerful tool of the modern mathematician. More general results may be deduced, and better classification effected, by means of analysis. In the general article **ANALYTIC GEOMETRY**, the aim and general method of procedure is given, together with a short history of the subject. The other articles may be conveniently read in the following order:

**Coördinates**  
**Graphic Method**  
**Curve**  
**Analysis**  
**Cartesians**  
**Parameter**  
**Locus**

**Contact**

**Normal**

**Tangent**

**Conic Sections**

**Circle**

**Pole and Polar**

**Parabola**

**Ellipse**

**Hyperbola**

**Surface**

**Cone**

**Conoid**

**Spheroid**

**Generation**

*Higher Plane Curves:*

In these, are included all transcendental and all algebraic curves above the second order. As an introduction, read the article **CURVE**. Some of the most important articles are:

**Cardioid**  
**Catenary**  
**Cisoid**  
**Conchoid**  
**Curve of Sines**  
**Cycloid**  
**Logarithmic Curve**  
**Spiral**  
**Lemniscate**  
**Loxodrome**  
**Witch**

6. **CALCULUS**. This term usually refers to **Differential and Integral Calculus**. **Differential Calculus** deals with the relation between indefinitely small quantities or infinitesimals, and is of great service when the quantities under consideration are constantly changing. The problem of **Integral Calculus** is the inverse of that of **Differential Calculus**. **Integral Calculus** also deals with the application of calculus to mechanics and geometry.

In the general article **CALCULUS**, the methods and applications of calculus are illustrated by the solution of practical problems. As a historical introduction, read:

Indivisibles (under Cavalieri)

Fluxions

The general article **CALCULUS**, should also be preceded by:

Analysis

Limits, Theory of

Infinity and the Infinitesimal

and followed by:

Maclaurin's Theorem (under Maclaurin)

Curve

Osculation

Quadrature

Differential Equations (under Equation)

7. **HIGHER MATHEMATICS** is a collective term for all branches of mathematics that follow calculus. Most of these branches are based on calculus, but some, like the theory of numbers and group theory, are independent of calculus. The following articles will furnish an introduction to some of the branches of higher mathematics:

Forms

Functions

Modern Geometry (under Geometry)

Non-Euclidean Geometry (under Geometry)

Quaternions

Substitution

Theory of Numbers (under Number)

8. **APPLIED MATHEMATICS** deals with the application of mathematics to related sciences, like Mechanics, Astronomy, Physics, etc. See these departments in this work.

9. **BIOGRAPHY.** Mathematical knowledge dates back to the Egyptian and Babylonian civilizations, but the real development begins in Greece. This was chiefly in the realms of geometry. Later it inclined toward arithmetic. The Romans did nothing for mathematics, and the Arabs very little more than to translate and preserve the Greek learning. Through them it was introduced into the cloisters in Europe during the Middle Ages. The modern period in the history of mathematics begins with Descartes's invention of analytic geometry. The following is a list of the most eminent mathematicians, arranged according to their nationality or period:

(a) *Greek:*

Thales

Pythagoras

Aristotle

Plato

Euclid

Archimedes

Diocles

Nicomedes

Hippias of Elis

Menelaus

Apollonius of Perga

Hero of Alexandria

Ptolemy

Diophantus

Pappus

(b) *Arab:*

Al-Khuwarizmi

Al-Battani

(c) *Hindu:*

Aryabhata

Brahmagupta

**Bhaskara**  
**Mahavir**

**(d) *Persian:***

**Omar Khayyam**

**(e) *From the revival of Mathematics  
in Europe to the middle of the  
17th century:***

**Gerbert[under Sylvester(Pope)]**  
**Fibonacci**  
**Jordanus**  
**Peurbach**  
**Regiomontanus**  
**Paccioli**  
**Tartaglia**  
**Cardan**  
**Viète**  
**Napier**  
**Descartes**

**(f) *From the middle of the 17th cen-  
tury to the present time:***

**Desargues**  
**Cavalieri**  
**Pascal**  
**Boscovich**  
**Fermat**  
**Wallis**  
**Barrow, I.**  
**Leibnitz**  
**Newton**  
**Bernoulli, Jakob**  
**Bernoulli, Johann**

**Bernoulli, Niclaus**  
**Bernoulli, Daniel**  
**Maclaurin**  
**Taylor**  
**Euler**  
**D'Alembert**  
**Monge**  
**Laplace**  
**Lagrange**  
**Legendre**  
**Fourier**  
**Gauss**  
**Poisson**  
**Poncelet**  
**Chasles**  
**Steiner**  
**Cauchy**  
**Möbius**  
**Lobachevsky**  
**Bolyai**  
**Abel**  
**Dirichlet**  
**Hamilton**  
**Jacobi**  
**Plücker**  
**Grassmann**  
**Galois**  
**Cayley**  
**Eisenstein**  
**Weierstrass**  
**Riemann**  
**Smith, H. J. S.**  
**Sylvester**  
**Clebsch**  
**Lie, Sophus**  
**Reye**

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## Chapter 15. Astronomy

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**A**STRONOMY is the science which treats of the heavenly bodies—the sun and moon, the planets and their satellites, comets and meteors, the stars and nebulae. Astronomy is usually divided into many branches; these branches, however, are not distinct and separate, but overlap in all directions, so that no convenience as regards treatment is gained. The arrangement of the articles in the following lists is not according to branches, but in accordance with the order in which they may be conveniently read.

A general history of the progress of astronomical discovery is given in the general article ASTRONOMY, which, therefore, forms a suitable introduction to the subject. For a knowledge of a few of the elementary terms used in astronomy, see:

Zenith  
Horizon  
Equator  
Ecliptic  
Pole  
Azimuth  
Altitude  
Declination  
Latitude and Longitude  
Parallels  
Meridian  
Diurnal Motion  
Culmination

### 1. ASTRONOMICAL OBSERVATIONS.

Astronomical observations are principally of two kinds: To determine distance, linear and angular; and to study the physical conditions of the heavenly bodies.

#### (a) Instruments:

Telescope  
Sextant  
Transit Instrument  
Meridian Circle  
Equatorial  
Zenith Telescope  
Micrometer  
Chronograph

Chronometer  
Spectroscope

#### (b) *Corrections to Astronomical Observations:*

Depression  
Parallax  
Refraction  
Twilight  
Aberration

#### (c) *Time:*

The determination of time is one of the most important problems in astronomy, and is effected by observing the time of transit across the meridian of some celestial object. For the determination of time, read:

Transit Instrument  
Sextant  
Chronometer  
Ephemeris  
Equation of Time

Various ways of reckoning time have been used in history. Some of the principal ways used by the ancients, and also those used at present, are given in the following articles:

Period  
Chronology

Calendar  
Hour  
Week  
Day  
Month  
Year  
International Date Line  
Prime Meridian Conference  
Time Signals  
Time, Standard

Eros  
Moon  
Gravitation  
Parallax  
Lunar Theory  
Nutation  
Perturbations  
Precession  
Tides  
Latitude, Variation of  
Seasons  
Orbit  
Elements  
Eclipse

## 2. THE SOLAR SYSTEM.

The solar system consists of the sun as a central body, around which revolve the planets with their satellites, some periodic comets, and meteoric swarms. In addition to these permanent members, the system is occasionally visited by other comets, which move in parabolic orbits. As a historical introduction, read:

Ptolemaic System  
Copernican System

Of the members of the solar system, the planetary system is of most immediate interest to us, since our earth is a member of this system. The sun and the planets, with their satellites and their interrelations, are treated in the following articles:

Sun  
Planets  
Solar System  
Planetoids  
Satellites  
Vulcan  
Mercury  
Venus  
Earth  
Mars  
Jupiter  
Saturn  
Uranus  
Neptune

COMETS are usually very small in mass, though this has great extent. They move in very eccentric orbits about the sun, and the planes of their orbits present a great variety. The constituent parts and physical characteristics, the mass, the spectra, the number, discoveries, the capture theory, and origin of comets are treated in the article COMET.

METEORS are masses of stone or iron, which sometimes are seen to fall to the earth from the sky. The circumstances of the fall, the meteoric showers, the probable cause, the matter, path, and number of meteors are treated in the articles:

Meteors  
Aërolite

## 3. THE STARS.

These bodies are usually called fixed stars, owing to the idea of the ancients that they were without motion. The fixity is, however, now disproved, and observations with the spectroscope show that they are moving with velocities comparable to those of bodies belonging to the solar system. Owing to

their immense distance, they appear, however, to keep their relative positions and configurations unchanged. This is only apparent, and there are stars whose displacement amounts to as much as 1" a year. In magnitude and physical condition, the stars are comparable with our sun, and many of them greatly exceed our sun in brightness and magnitude. The designation, magnitude, nature, and number of stars, the constellations, stellar parallax, proper motion, spectra, photometry, variable stars, double and multiple stars, binary stars, etc., are treated in the following articles:

Star  
 Constellation  
 Culmination  
 Pole Star  
 Zodiac  
 Galaxy  
 Parallax  
 Variable Star  
 Astro-Photography

THE NEBULÆ are faintly shining cloudlike patches of matter in the sky, scattered among the stars. They are supposed to be stars under formation. The nature, forms, and magnitudes of nebulae, the spectra, distribution, distance, etc., are treated in the article NEBULÆ.

4. ASTRONOMICAL OBSERVATORIES are buildings where the instruments and machinery necessary for the observation of the heavenly bodies are kept. The equipment, location, etc., together with a description of some of the largest observatories in the world, are treated in the following articles:

Observatory  
 Lick Observatory

Naval Observatory  
 Pulkova  
 Yerkes Observatory  
 Greenwich Observatory  
 Harvard College Observatory  
 Mount Wilson Solar Observatory

5. COSMOGONY deals with the theory of operations by which the present condition of the universe came about. Various systems of cosmogony have prevailed at different times. See:

Cosmogony  
 Nebulae

6. ASTROLOGY deals with the supposed influence of the heavenly bodies upon human affairs and the drawing of horoscopes. Astrology was the forerunner of astronomy, and for centuries astronomical observations were made mainly to supply data for astrology. See ASTROLOGY.

#### 7. BIOGRAPHY.

Observational astronomy dates back to the Chinese and Chaldeans, but the first real attempt to explain the movements of the heavenly bodies is due to the Greeks. The ideas of the Greeks held sway till Copernicus substituted a more harmonious system. Gravitational astronomy begins with Newton, who made it possible to explain the movements of the heavenly bodies, while Galileo's invention of the telescope gave a means of finding out what they are in themselves. The following is a list of the most prominent contributors to astronomy:

Hipparchus  
 Ptolemy  
 Brahe  
 Kepler  
 Galileo

Galileo  
Newton  
Bradley  
Halley  
Roemer  
Cassini, Jacques  
Cassini, G. D.  
Flamsteed  
Herschel, Sir William  
Herschel, Sir J. F. W.  
Laplace  
Bessel  
Bode  
Delambre  
Olbers  
Piazzi  
Pond

Baily  
Hansen  
Struve, F. G. W.  
Encke  
Leverrier  
Adams, J. C.  
Airy  
Rosse  
Rutherford  
Struve, Otto  
Galle  
Huggins  
Lockyer  
Gill, Sir David  
Pickering  
Hale, G. E.



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# Chapter 16. Physics

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**I**N undertaking systematic reading in any particular science, it is well at the outset to realize the province and limitations of that science, as they have been determined and observed in the past by its devotees, and what, if there have been changes, is the modern conception of the scope of the particular department of knowledge so known. With this especial object, the article on PHYSICS has been written, and serves to introduce the reader to the subject, as discussed in more detail under the broad subdivisions of ACOUSTICS, ELECTRICITY, HEAT, LIGHT, MECHANICS, LABORATORY, MAGNETISM and RADIOACTIVITY. Taking up these subjects separately, and also the article on LABORATORY, we shall find in each case the general article referred to, and such minor articles as are demanded.

## 1. ACOUSTICS.

Dealing with theoretical questions, the more important topics on the nature and theory of sound are included in the following list:

- Acoustics
- Section *Origins* under Music
- Diatonic Scale
- Phonetics
- Resonance
- Resonator
- Node

For special purposes and investigation dealing with the production and propagation of sound waves, there has been devised much interesting apparatus, certain forms of which, as the telephone, phonograph, megaphone, etc., have found their way into universal application. See:

- Siren
- Speaking Trumpet
- Megaphone
- Ear-Trumpet
- Acoumeter
- Phonograph
- Talking Machine
- Graphophone
- Telephone
- Tuning-Fork
- Organ

## 2. ELECTRICITY.

To supplement the general article ELECTRICITY, and those of a theoretical nature treating Ionization and Electrons, it is desirable to consult articles dealing with the generation of the current, as DYNAMO-ELECTRIC MACHINERY, the VOLTAIC CELL, the DRY PILE, THERMO-ELECTRICITY, and also study the effects of INDUCTION and self-induction. We can learn how the magnetic strength of a solenoid is influenced by the number of AMPERE TURNS. As supplemental, then, to the article on electricity, the following articles may be cited:

### (a) *Fundamental Phenomena:*

- Current
- Conductor
- Resistance
- Shunt
- Electrostatics (under Electricity)
- Condenser
- Ampere Turns
- Solenoid
- Induction
- Induced Electric Currents (under Electricity)
- Foucault Currents

### (b) *Electrical Units:*

- Electrical Units

Ampere

Volt

Ohm

Henry

Farad

Coulomb

Watt

(c) *Electrostatic Apparatus:*

Electrophorus

Electrical Machine

Electroscope

Leyden Jar (under Condenser)

Barometric Light

Brush

Elmo's Fire, Saint

(d) *Measuring Instruments:*

Galvanometer

Ammeter

Voltmeter

Voltameter

Wheatstone's Bridge

Electrometer

Electric Meters

Induction Balance

(e) *Discharge in Gases or in Vacuo:*

Anode

Discharge through Gases (under Electricity)

Geissler's Tubes

Crookes Tube

X-Rays

(f) *Electric Currents:*

Galvanic Battery

Voltaic Cell or Battery

Dry Pile

Storage Battery

Dynamo Electric Machinery

Thermo-Electricity

Thomson Effect

ence should be made to CALORIMETRY to ascertain how the amount of heat possessed by various bodies is measured, and to THERMOMETRY to learn how the temperature or degree of heat is determined. THERMODYNAMICS enables us to consider the relation between heat and work. See:

Heat

Calorimetry

Thermometry

Diathermancy

Regelation

Radiation

Thermodynamics

Spheroidal State

Of a more practical character, are those articles involving the consideration of methods and apparatus, such as those which discuss the LIQUEFACTION OF GASES and FREEZING MIXTURES. A list of this kind would include:

Cryophorus

Freezing Point

Freezing-Mixtures

Liquefaction of Gases

Melting-Point

Boiling-Point

Critical Point

Refrigeration

Zero

Thermometer

Pyrometer

Thermoscope

Microtasmeter

Radiation

Radiometer

Radiation Pressure

Bolometer

Hygrometer

Safety-Lamp

3. HEAT.

Following the arrangement already specified for the study of heat, refer-

#### 4. MAGNETISM.

Complete articles on **MAGNETISM** in general and on **TERRESTRIAL MAGNETISM**, with charts, leave but little to be said in addition. The instruments used in studying magnetism, and especially the ship's compass, with its important adjustments, are also the subjects of further description. See:

Magnetism  
 Terrestrial Magnetism  
 Diamagnetism  
 Compass  
 Declination  
 Declinometer  
 Dipcircle  
 Inclination  
 Isoclinic  
 Isogonic  
 Magnetometer  
 Magnetic Elements  
 Magnetic Equator  
 Magnetic Observatory  
 Armature  
 Alloys, Magnetic  
 Astatic Needle

#### 5. LIGHT.

In the study of optics, there are numerous opportunities to branch off from a general treatment and carry on independent investigation in a particular field. Starting with the motion of the ether, known as light, we are able to study its **VELOCITY** and also the intensity. For the latter, photometers are employed, and the subject of **PHOTOMETRY** presents a record of many different instruments and methods. The useful application of light is included under **ILLUMINATION**. By reason of its wave motion when **DIFFRACTION** and **INTERFERENCE** take place **FRINGES** are formed, and also there re-

sults the phenomenon known as colors of thin plates. This principle of interference is the basis of one process of **COLOR PHOTOGRAPHY**; several processes are described under that title. In fact, numerous other examples could be cited, but reference to the following list will clearly indicate the extent of the range of subjects:

##### (a) *Light:*

Light  
 Velocity of Light  
 Ether  
 Diffraction and Diffraction Gratings  
 Interference  
 Fringes  
 Colors of Thin Plates (under Light)  
 Newton's Rings  
 Photometry  
 Reflection  
 Caustic  
 Refraction  
 Polarization  
 Prism  
 Dispersion  
 Color  
 Complementary Colors  
 Achromatism  
 Rainbow  
 Lens  
 Foci  
 Aberration, Chromatic  
 Aberration, Spherical  
 Spectroscopy  
 Fluorescence  
 Phosphorescence  
 Zeeman Effect  
 Mirage  
 Fata Morgana

##### (b) *Optical Instruments:*

Telescope  
 Opera Glass

Field Glass  
 Object-Glass  
 Eyepiece  
 Field of View  
 Microscope  
 Solar Microscope  
 Camera Lucida  
 Camera Obscura  
 Aplanatic Lens  
 Spectroscope  
 Stereoscope  
 Magic Lantern  
 Moving Pictures  
 Kinetoscope  
 Dissolving Views  
 Diaphragm  
 Polariscope  
 Nicol Prism  
 Analyzer  
 Polar Clock  
 Kaleidoscope  
 Chromatope  
 Zoëtrope  
 Fluoroscope  
 Diaphanoscope  
 Cyanometer  
 Dioptrimeter  
 Magic Mirror of Japan

(c) *Photographic Processes:*

Photography  
 Photo-Chemistry  
 Negative  
 Ambrotype  
 Daguerreotype Process  
 Copying  
 Color Photography  
 Photo-Engraving  
 Calotype Process  
 Cyanotype Process  
 Ferrotype  
 Fothergill Process  
 Photolithography (under Li-  
 thography)  
 Gelatin Process

6. MATTER AND MECHANICS.

Under this head, we may include a consideration of matter, including its general properties and the theories advanced to explain it, as well as the questions concerned with the motion of matter, and the methods and units employed to measure this motion. Considering the first subdivision, it is necessary to concern ourselves with the following titles:

Matter  
 Vortex  
 Molecules  
 Inertia  
 Porosity  
 Ductility  
 Elasticity  
 Flexure  
 Viscosity  
 Gases, General Properties of  
 Effusion  
 Cohesion  
 Adhesion

The science of mechanics deals with the motion of matter. After reading the fundamental article *MECHANICS*, the reader will be prepared to appreciate the associated articles as well as those dealing with the various stages of applied mechanics. Included in the former class, are the following:

Mechanics  
 Dynamics  
 Kinetics  
 Kinematics  
 Statics  
 Moment  
 Momentum  
 Velocity  
 Acceleration  
 Force  
 Potential

Central Forces

Couple

Energetics

Centre of Gravity

“ “ Gyration

“ “ Inertia

“ “ Oscillation

“ “ Percussion

“ “ Pressure

Aerostatics

Aerodynamics

Pneumatics

Hydrostatics

Hydrodynamics

Vortex

Waves

Stability

Impact

Gravitation

Falling Bodies

Vector

Capillarity

Mechanical Powers

Inclined Plane

Lever

Wheel and Axle

Pulley

Pendulum

Projectiles, Motion of

In order to measure motion and its effect, there are required systems of units, and these are usually arranged on such a basis that they are parts of a symmetrical system, such as the C. G. S. (Centimeter, Gramme, Second) system. This matter is fully explained in the following articles:

C. G. S.

Mechanical Units

Dimensions

Dyne

Erg

Foot-Pound

Joule

Watt

Kilowatt

Horse-Power

For the measurement and study of matter and its motion and other properties, numerous important pieces of physical apparatus have been devised. Thus, to measure the pressure of the atmosphere, or a gas, we have the **BAROMETER** and the **MANOMETER**. To remove the air from a vessel, the **AIR PUMP** is applied. For the linear measures, we have scales constructed with the **DIVIDING ENGINE** and compared with standards on the **COMPARATOR**. Instruments of such nature are included in the following list:

Air Pump

Barometer

Barometer, Water

Aneroid

Manometer

Magdeburg Hemispheres

Specific Gravity

Hydrometer

Jolly Balance

Balance

Spring Balance

Weighing Machine

Torsion Balance

Weights and Measures

Metric System

Dividing Engine

Comparator

Atwood's Machine

Barker's Mill

Hero's Fountain

## 7. MODERN THEORIES.

Modern Physics has many recent developments to record in the field of theory and many of the ideas once considered fixed and definite have been put to the test severely under later

conditions. Even GRAVITATION, whose laws were once considered fundamental, has been considered in the light of modern thought, while the recognition of the ELECTRON and the part played by IONIZATION has modified our original idea of ELECTRICITY and the ETHER. Furthermore, we have the new conception of RELATIVITY. Whatever the existence of matter and its explanation, yet when electrical oscillations take place or material bodies emit energy, or as it is termed, RADIATION, a wide range of phenomena is produced ranging from the Electromagnetic waves used in WIRELESS TELEGRAPHY and TELEPHONY to the waves of light. When the radiations are produced by the discharge of electricity through a vacuum we have the phenomena of the X-rays, while if the radiations are furnished spontaneously, as by such radioactive elements as RADIUM, THORIUM, etc., there are afforded the varied series of phenomena that would seem to indicate transformation of one element to another and bear an important relation to the theory and explanation of matter. Accordingly, in this connection, one could read with profit the articles on:

- Ether
- Gravitation
- Relativity
- Radiation
- Radiation Pressure
- Radium
- Radioactivity
- Electricity
- Light
- X-rays
- Waves

RADIOACTIVITY, by reason of its relation to theories of matter and the

involved phenomena, both physical and chemical, is now entitled to stand as a distinct Department of Physics, in so far as the physical phenomena are concerned.

The main article on this subject deals with the theories which have been advanced to explain the many interesting phenomena of the Radioactive substances. Accordingly one should read, in addition to this article, those on the various Radioactive elements, such as:

- Radium
- Uranium
- Actinium (particularly)
- Thorium
- Polonium

The biographies of the leading workers in this field, such as the Becquerels, Sir William Crookes, Professor and Madame Curie, Ernest Rutherford, Frederick Soddy and J. J. Thomson. and others referred to in the various articles. should also be read.

## 8. BIOGRAPHIES OF PHYSICISTS.

Some of the greatest achievements in that branch of science which is now known as Physics have been the work of philosophers who have also accomplished much in other fields, and consequently it is impossible, particularly in the case of ancient and mediæval scientists, to term them physicists, and include them in such a list. Also, in modern times, the work of the chemist, of the engineer, of the meteorologist, of the astronomer, and of other scientific workers, closely approaches or actually transgresses the limits which the physicist has set for himself. Therefore, the following list does not include all the principal workers, but a

certain number who primarily are distinguished for their work in physics.

Abney, W. de W.  
Amici, G. B.  
Amontons, G.  
Ampère, A. M.  
Arago, D. F.  
Archimedes  
Atwood, George  
Bache, Alex. D.  
Bacon, Roger  
Becquerel, A. C.  
Becquerel, A. E.  
Becquerel, A. H.  
Bell, A. G.  
Biot, Jean B.  
Boyle, Robert  
Brewster, Sir D.  
Bunsen, R. W.  
Cailletet, L. P.  
Carhart, H. S.  
Carnot, N. L. S.  
Cavendish, H.  
Chladni, E. F. F.  
Clausius, R. J. E.  
Coulomb, C. A.  
De la Rive, A. A.  
Dollond, John  
Dove, H. W.  
Edison, T. A.  
Ewing, J. A.  
Fahrenheit, G. D.  
Faraday, M.  
Ferrari, G.  
Fleming, J. A.  
Forbes, J. D.  
Foucault, J. B. L.  
Fraunhofer, Joseph von  
Fresnel, A. J.  
Galvani, L.  
Gauss, K. F.  
Gay-Lussac, J. L.  
Geissler, H.  
Gilbert, W.

Glazebrook, R. T.  
Gray, Elisha  
Grove, Sir W. R.  
Guericke, O. von  
Haidinger, W. von  
Halley, E.  
Hauksbee, F.  
Helmholtz, H. von  
Henry, Joseph  
Hero of Alexandria  
Herschel, Sir W.  
Hertz, H.  
Hittorf, J. W.  
Holtz, W.  
Hopkinson, J.  
Huygens, C.  
Jenkin, H. C. F.  
Jolly, P. von  
Joule, J. P.  
Kater, H.  
Kirchhoff, G. R.  
Kohlrausch, F.  
Kundt, A.  
Laplace, P. S. de  
Leslie, Sir J.  
Lodge, Sir O. J.  
Magnus, H. G.  
Malus, E. L.  
Mariotte, E.  
Mascart, E. E. N.  
Maxwell, J. C.  
Mayer, A. M.  
Mayer, J. R. von  
Mendenhall, T. C.  
Michelson, A. A.  
Morse, S. F. B.  
Newton, Sir Isaac  
Nichols, E. L.  
Oersted, H. C.  
Ohm, G. S.  
Ostwald, W.  
Papin, D.  
Pictet, R.  
Plateau, J. A. F.

Pupin, M. I.	Thompson, S. P.
Quincke, G. H.	Thomson, Sir J. J.
Rankine, W. J. M.	Thomson, William (Lord Kelvin)
Rayleigh, J. W. S.	Torricelli, E.
Réaumur, R. A. F. de	Trowbridge, J.
Regnault, H. V.	Tyndall, J.
Roentgen, W. K.	Van't Hoff, J. H.
Rowland, H. A.	Violle, J.
Rühmkorff, H. D.	Volta, A.
Sabine, Sir E.	Watt, J.
Siemens, Sir W.	Weber, W.
Somerville, Mary	Wheatstone, Sir Charles
Steinheil, K. A.	Wiedemann, G.
Stevin, S.	Wilde, H.
Stokes, Sir G. G.	Woodward, R. S.
Tait, P. G.	Wroblewski, Z. F.
Tesla, N.	Young, T.



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## Chapter 17. Aëronautics

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**I**N only a very recent work of reference would it be possible to assemble a number of articles dealing with the modern theory and art of aërial navigation. Indeed, the practice of aëronautics has been so affected by the great War in Europe that the military and naval aspects of the matter have become predominant, and while the mechanical features are closely connected, yet the general reader at the present time is likely to be more concerned with the use of the aëroplane and dirigible in warfare.

In the *NEW INTERNATIONAL ENCYCLOPÆDIA* the student will find first a general article on *AËRONAUTICS*, in which the history of the evolution of the dirigible or airship from the balloon and of the aëroplane, from the earliest attempts at securing flight with a machine heavier than the displaced air, is traced. He will also find in the article on *GASES, GENERAL PROPERTIES OF*, the fundamental theory involved, and in the articles on *MILITARY* and *NAVAL AËRONAUTICS* the applications to warfare. In the section on *Aërial Operations*, in the long article on the *WAR IN EUROPE*, will be found a discussion of the use made of these machines in reconnaissance and combat.

The successful evolution of machines that could navigate air also has brought about legal problems and indicated changes both in international law and in other statutes or principles of law involved in the rules of the road and other obvious practices. Accordingly, a list of useful articles for one engaged in research in this field would be the following:

Aëronautics  
Aërodynamics  
Aërostatics  
Military Aëronautics  
Hangar  
Navigation, Aërial, Law of  
International Law

War in Europe (Section on Aërial  
Operations)  
Gases. General Properties of  
Internal Combustion Motors  
Military or Man-Raising Kite  
Kite

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## Chapter 18. Chemistry

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**T**HE importance, for practically everybody, of acquiring a knowledge of chemistry hardly needs to be emphasized. Chemical facts and principles are involved, to a considerable extent, in every science and in every branch of industry, and chemical questions come up often in nearly every sphere of human activity.

In the *NEW INTERNATIONAL ENCYCLOPÆDIA* the science and applications of chemistry are treated in a large number of articles, many of which were written so as to serve a double purpose: first, to supply information on their special topics, without reference to chemical science as a whole, or to any other chemical topic; secondly, to form integral parts of an exposition of chemistry, for those who may desire to use the *Encyclopædia* for the acquisition of a general acquaintance with the subject. To serve the second purpose, they were written from a single viewpoint—on the whole, that of the German school of physical chemistry, now all but universally recognized as the best founded and most fruitful mode of viewing chemical phenomena. To serve the first purpose, which is all-important in a work of reference, each article (with few unavoidable exceptions), besides being written in simple terms, is supplied with all the information that is necessary to an understanding of the subject it treats, so that in most of the articles, no preliminary chemical knowledge is pre-supposed. But even in those articles in which the assumption of some preliminary knowledge could not, for obvious reasons, be avoided, no information was pre-supposed beyond what may be readily found in the *Encyclopædia* itself. Furthermore, in most of the articles the more essential information is concentrated in the opening paragraphs, the more technical and less essential in later parts of the article; so that glancing over the first paragraph alone may be sufficient for many purposes. If the end in view be the acquisition of some general knowledge of chemistry, the articles should be read entirely and carefully and the leading points briefly noted down, so as to afford, at any time of the reading, a clear retrospect over the ground covered.

For purposes of systematic reading, the chemical articles in the *Encyclopædia* may be grouped as follows: 1, Those dealing with general fundamental principles; 2, those dealing with the principal classes of carbon compounds; 3, those dealing with the theories of physical chemistry; 4, those articles, or sections of articles, dealing with the history of chemistry; 5, articles on the chemical elements; 6, articles on the principal compounds occurring in the living organism; 7, articles on other substances, inorganic and organic, presenting either theoretical or practical interest. In the following chapter devoted to *INTERNATIONAL CHEMISTRY*, as well as in the section on *Manufactures*, will be found listed and discussed the articles that deal with modern industrial processes and their products.

The order of this classification is the general reader, of principles and based on the relative importance, to facts. Should the course of syste-

matic reading be interrupted at some stage, a knowledge of at least some of the principles of chemistry ought to be much more valuable than a knowledge of some data concerning individual compounds, such as would be acquired if, following the usual order of chemical studies in schools, the course should be commenced by a perusal of the descriptive articles on the elements and their principal inorganic compounds.

### 1. FUNDAMENTAL PRINCIPLES AND PHENOMENA.

- Chemistry
- Analysis, Chemical
- Atomic Weights
- Avogadro's Rule
- Molecules
- Periodic Law
- Spectrum Analysis
- Reaction, Chemical
- Decomposition
- Dissociation
- Catalysis
- Nascent State
- Combustion
- Spontaneous Combustion

### 2. CARBON COMPOUNDS.

The compounds of carbon, numbering roughly 150,000, form the subject of organic chemistry, one of the most extensive and important branches of modern chemical science. In this branch the atomic and other theories have found a field for some of their most useful applications; and it is, therefore, advisable to acquire some knowledge of it at any early stage in chemical reading. The following is a list of the principal articles dealing with this branch; to be supplemented,

of course, on the practical side by those dealing with industrial processes as given in the following chapter:

- Carbon Compounds
- Stereo-Chemistry
- Alcohols
- Mercaptans
- Ethers
- Aldehydes
- Ketones
- Amines
- Amides
- Ureas
- Valence
- Carbohydrates
- Phenols
- Organo-Metallic Bodies
- Alkaloids

### 3. PHYSICAL CHEMISTRY.

Within recent years, physical chemistry has attained a degree of importance which makes some knowledge of it indispensable.

It is believed that this justified the introduction in the Encyclopædia of a somewhat extensive treatment of the subject. Following is a list of the principal articles, in the order in which it would seem advisable to read them:

- Avogadro's Rule
- Boiling-Point
- Freezing-Point
- Melting-Point
- Solution
- Dissociation
- Colloids
- Thermo-Chemistry
- Phase Rule
- Electro-Chemistry, General
- Photo-Chemistry
- Critical Point
- Evaporation

Distillation  
Sublimation  
Radioactivity

#### 4. HISTORY OF CHEMISTRY.

The history of a great science, if studied after some knowledge of the principles and problems of the science has been acquired, has in itself a fascination for almost every mind. But, in the case of chemistry, many authorities have maintained that a knowledge of the history is not merely interesting, but absolutely indispensable to a thorough understanding of the science itself. In the *Encyclopædia*, a simple presentation of the development of chemical thought, and the gradual elimination of past errors of principle and method, will be found in the general article CHEMISTRY. Further historical information will be found in the article ALCHEMY, in the articles on physical chemistry, in those describing the elements and many chemical compounds, and especially in the biographies of celebrated chemists. Following is a list of some of the best-known names in the history of chemistry:

Helmont, J. B. van  
Becher, J. J.  
Stahl, G. E.  
Black, J.  
Priestley, J.  
Cavendish, H.  
Lavoisier, A. L.  
Klaproth, M. H.  
Dalton, J.  
Wollaston, W. H.  
Berzelius, J. J.  
Davy, H.  
Berthollet, C.  
Avogadro, A.  
Gay-Lussac, J. L.

Mitscherlich, E.  
Liebig, J.  
Wöhler, F.  
Chevreul, M. E.  
Dumas, J. B.  
Laurent, A.  
Gerhardt, K. F.  
Gmelin, L.  
Sainte-Claire Deville, H. E.  
Cannizzaro, S.  
Graham, T.  
Kolbe, H.  
Bunsen, R. W.  
Roscoe, H. E.  
Berthelot, P. E. M.  
Wurtz, C. A.  
Hofmann, A. W.  
Regnault, H. V.  
Pasteur, L.  
Mendeléeff, D.  
Schorlemmer, C.  
Baeyer, A.  
Fischer, E.  
Van't Hoff, J. H.  
Ostwald, W.  
Nernst, W.  
Arrhenius, S.  
Curie, M. S. and P.  
Crookes, W.  
Ramsay, W.

#### 5. THE CHEMICAL ELEMENTS.

The articles on the chemical elements will be found to contain descriptions, not only of the elements themselves, but also of their principal compounds, so that each article forms a chapter of inorganic chemistry. Following is a list of some of the principal articles in a recognized order of arrangement:

Hydrogen  
Oxygen  
Nitrogen  
Carbon

Chlorine  
Bromine  
Iodine  
Fluorine  
Sodium  
Potassium  
Lithium  
Magnesium  
Calcium  
Strontium  
Barium  
Zinc  
Cadmium  
Mercury  
Boron  
Aluminium  
Silicon  
Tin  
Lead  
Zirconium  
Thorium  
Phosphorus  
Arsenic  
Antimony  
Bismuth  
Sulphur  
Selenium  
Tellurium  
Chromium  
Molybdenum  
Tungsten  
Uranium  
Manganese  
Iron  
Cobalt  
Nickel  
Platinum  
Palladium  
Copper  
Silver  
Gold

Articles on the rest of the elements, including the rare gases ARGON, HELIUM, NEON, KRYPTON, and XENON,

and of the radioactive elements, including RADIUM, POLONIUM, ACTINIUM, and THORIUM, will be found in their proper places. In connection with the radioactive elements, reference should be made to the article on RADIOACTIVITY. A list of the elements, with their chemical symbols and atomic weights, will be found in the article ATOMIC WEIGHTS.

#### 6. COMPOUNDS OCCURRING IN LIVING ORGANISMS.

Physiological chemistry deals with the individual compounds forming the chemical ingredients of the materials of which living organisms and their products (*e. g.*, milk) are made up. A knowledge of the chemical and physical properties of those compounds is indispensable in the study of chemical physiology, and hence of physiology in general. The following is a list of the more important physiological compounds described under their names in the Encyclopædia:

Albumen  
Allantoïn  
Carbohydrates  
Cellulose  
Carnin  
Casein  
Cerebrin  
Chitin  
Cystin  
Elastin  
Fats  
Fibrin  
Gelatin  
Globulins  
Glycogen  
Guanin  
Hypoxanthin  
Keratin

Kreatin  
Kreatinin  
Legumin  
Leucin  
Ossein  
Proteins  
Starch  
Syntonin  
Taurin  
Urea  
Uric Acid  
Hæmatin  
Hæmoglobin

Trimethylamine  
Aniline  
Pyridine  
Quinoline  
Alkaloids  
Ptomaines

The article ALKALOIDS contains a list of the important members of this class of substances, with their principal characteristics. More extensive descriptions are given in the special articles on all the more important alkaloids.

#### 7. OTHER IMPORTANT ARTICLES ON CHEMICAL SUBJECTS.

##### (a) *Metallic Alloys:*

Alloy  
Amalgam  
Babbitt Metal  
Brass  
Britannia Metal  
Bronze  
Fusible Metal  
German Silver  
Phosphor-Bronze  
Pewter  
Pinchbeck  
Platiniridium  
Spence's Metal

##### (b) *Bases:*

The inorganic bases, *i. e.*, metallic oxides and hydroxides, are mostly described in connection with the metallic elements. Important special articles are:

Ammonia  
Lime  
Soda

The articles on organic bases include:

Amines  
Ethylamine

##### (c) *Acids:*

All the more important acids are described in special articles under their names. Many acids of secondary importance are mentioned in connection with their characteristic elements. Following is a partial list of important articles on acids:

##### i. General:

Acids  
Phenols

##### ii. Inorganic:

Sulphuric Acid  
Hydrochloric Acid  
Nitric Acid  
Sulphureted Hydrogen  
Phosphoric Acid  
Hydrobromic Acid  
Hydriodic Acid  
Hydrofluoric Acid  
Chloric Acid  
Perchloric Acid  
Hypochlorous Acid  
Nitrous Acid  
Hyponitrous Acid  
Phosphorous Acid  
Hypophosphorous Acid  
Manganic and Permanganic  
Acids

## iii. Organic:

Acetic Acid  
 Benzoic Acid  
 Butyric Acid  
 Caproic, Caprylic, and Capric  
   Acids  
 Carboic Acid  
 Carbonic-Acid Gas  
 Cinnamic Acid  
 Citric Acid  
 Cyanic Acid  
 Cyanuric Acid  
 Formic Acid  
 Fumaric and Maleic Acids  
 Gallic Acid  
 Glycin  
 Hippuric Acid  
 Hydrocyanic Acid  
 Hydroferricyanic Acid  
 Hydroferrocyanic Acid  
 Lactic Acid  
 Lauric Acid  
 Malic Acid  
 Margaric Acid  
 Meconic Acid  
 Myristic Acid  
 Senanthylic Acid  
 Oleic Acid  
 Oxalic Acid  
 Palmitic Acid  
 Picric Acid  
 Stearic Acid  
 Succinic Acid  
 Tannic Acid  
 Tartaric Acid  
 Uric Acid  
 Valeric Acid

An important "homologous series" of acids, included in this list, is constituted by the following so-called "fatty acids":

Formic  
 Acetic

Butyric  
 Valeric  
 Caproic  
 Caprylic  
 Capric  
 Senanthylic  
 Lauric  
 Myristic  
 Palmitic  
 Margaric  
 Stearic

Allied to the last-named is Oleic Acid.

The acid anhydrides are mostly mentioned in connection with the metalloid elements.

(d) *Salts*:

Salts are mostly described in connection with either the acids or the bases combined in them. The following are a few special articles on salts:

Alum  
 Borax  
 Cream of Tartar  
 Epsom Salt  
 Glauber's Salt  
 Iodides  
 Rochelle Salt  
 Ichthyol  
 Saltpetre  
 Soda

Bases, acids, and salts constitute together the so-called "electrolytes." Their peculiar behavior in aqueous solutions has led to the formulation of the now well-known theory of electrolytic dissociation, which may be found treated in the articles SOLUTION, DISSOCIATION, and ACIDS.

(e) *Hydrocarbons*:

Hydrocarbons  
 Methane

Ethane  
Propane  
Butane and Isobutane  
Ethylene  
Acetylene  
Benzene  
Naphthalene  
Anthracene

Further information concerning hydrocarbons may be found in articles on such products as oils (volatile), paraffin, ozokerite, petroleum, benzine, rubber, gutta-percha, gas (illuminating and natural), etc.

(f) *Other important compounds:*

Water  
Hydrogen Dioxide  
Ozone  
Alcohol  
Methyl Alcohol  
Glycerin  
Mannite  
Aldehyde  
Chloral  
Acetone  
Almonds, Volatile Oil of  
Acrolein  
Acetone  
Ether  
Chloroform  
Iodoform  
Nitro-Benzene  
Carbides  
Calcium Carbide  
Carbon Disulphide  
Carbonic Oxide  
Cyanogen

(g) *Pigments, Dyestuffs, and Allied Subjects:*

Paints  
Mineral Colors  
Vegetable Colors

Dyeing  
Mordants  
Coal-Tar Colors  
Tar  
Coal Tar  
Indigo  
Alizarin  
Purpurin  
Aurin  
Rosolic Acid  
Archil  
Arnotto  
Carmine  
Cochineal  
Flavin  
Fustic  
Henna  
Indian Yellow  
Lac Dye (under Lac)  
Litmus  
Madder  
Orcin  
Orcein  
Logwood  
Murexid  
Phenicin  
Quercitron  
Green  
Brunswick Green  
Turkey Red  
Cinnabar  
Blue  
Indigo  
Lampblack  
White Lead

A list of the widely used coal-tar colors ("aniline dye-stuffs"), with their principal characteristics, will be found in the article COAL-TAR COLORS.

(h) *Waxes, Fats, Oils, and Soap:*

Waxes  
Beeswax  
Spermaceti



Fats  
 Palmitin  
 Stearin  
 Olein  
 Oils  
 Almonds, Expressed Oil of  
 Almonds, Volatile Oil of  
 Canada Balsam  
 Castor Oil  
 Cod-Liver Oil  
 Croton Oil  
 Garlic, Oil of  
 Grass-Oil  
 Gurjun Balsam  
 Lemon Oil  
 Menthol  
 Petroleum  
 Turpentine  
 Wintergreen, Oil of  
 Soap

All the typical waxes and oils are described in the general articles under these names. Paraffin, which is sometimes spoken of as "paraffin wax," is described in an article under its own name.

(i) *Gums and Resins:*

Gums  
 Resins  
 Amber  
 Ammoniac  
 Anime  
 Arabin  
 Copal  
 Bassora Gum  
 Bdellium  
 Catechu  
 Dragon's Blood  
 Gambir  
 Gamboge  
 Gum Arabic (under Gums)  
 Kino  
 Mucilage

Olibanum  
 Podophyllin  
 Rosin  
 Sandarac  
 Scammony

Camphor, which is sometimes spoken of as "gum camphor," is described under its own name. "British gum," a substitute for gum arabic, is described under DEXTRIN.

(j) *Explosives:*

The chemistry of EXPLOSIVES, both those employed for military purposes and in mining and other industries, represents a field in which the theoretical and technological advances have been extraordinary, and the new compounds that the chemist has invented have played their part in peace and war. In no department of chemistry have there been more interesting developments than in the theory of Explosives and the various groups into which modern Explosives are classified all present interesting theoretical considerations for the chemist.

Accordingly, the student interested in the history, classification and theory of Explosives, and wishing to learn of the various explosive mixtures, of the nitrates, of the chlorates and perchlorates, and compounds derived by nitro-substitution, and those compounds known as nitro-derivatives, as well as smokeless powders, nitro-glycerin, fulminates and amides, should read the article on EXPLOSIVES, which not only discusses theory, but the growth of the industry in the United States and the use of Explosives in industry, such as for blasting and mining, and the regulations attending their transportation and stor-

age. Of course, the older forms of Explosives are discussed under gunpowder, while GUNCOTTON, NITRO-GLYCERIN and NITRO-CELLULOSE show the application of these substances to this branch of chemistry. *Dynamite* is typical of the articles on high power explosives, while the article on TRINITROTOLUENES describes one of the latest of the powerful military explosives.

An appropriate list for careful reading in this department would be as follows:

- Dualine
- Dynamite
- Extralite
- Explosives
- Emmensite
- Nitroglycerin

- Guncotton
- Gunpowder
- Melinite
- Lyddite
- Magazine
- Nitrocellulose
- Pyroxylin
- Stemming
- Trinitrotoluenes

(k) *Waters:*

- Water
- Ice
- Distilled Water
- Aërated Waters
- Carbonated or Acidulous Waters
- Chalybeate Waters
- Mineral Waters
- Selters Water
- Apollinaris Water

Many of the foregoing articles are concerned either with theory or with the nature and composition of various chemical elements or substances, apart from their uses in the arts, where the labors of modern research chemists have found wide and useful application. Accordingly, the following chapter on INDUSTRIAL CHEMISTRY will take up some of the more important substances and processes that enter into modern technology.

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# Chapter 19. Industrial Chemistry

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**H**AVING mastered the underlying principles and more important facts of chemistry, such as the nature of the various elements, the conditions under which they exist and the laws under which they combine, and the most generally and commonly employed chemical substances, the reader interested in the practical applications of this vast field of theoretical science naturally will desire information as to the extent to which scientific chemistry figures in the arts, and some description of the various technological processes involved in wholesale production. Methods of manufacture representing theory reduced to practice often involve the results of the most refined research and scientific investigation, by which everyday materials are produced for general use and the benefit of mankind. Vast industries involving both inorganic and organic chemistry have been built up on the labors of the scientist, and as trade follows the flag so manufacturing prosperity follows and in large measure depends on the labors of the industrial chemist.

The reader of this department in *THE NEW INTERNATIONAL ENCYCLOPEDIA*, who first has studied the leading articles of the last chapter, probably would be best served by taking up first the articles dealing with the various processes of industrial chemistry, noting especially how the methods of the factory differ from those of the laboratory.

Leading articles in this field would be:

Lixiviation  
Evaporation  
Distillation  
Sublimation  
Filter and Filtration  
Filter Press  
Bleaching  
Calcining  
Refrigeration  
Roasting  
Electro-Chemistry

## FUEL.

Then, as heat plays an important part in all industry, chemical and other, a study of fuels would be next in order. Fundamentally and generally these are discussed in the article on *FUEL*. There are articles on the various solid and liquid fuels to which reference should be made for the im-

portant by-products involved, as in the case of the coal-tar colors, ammonia, hydrocarbons and other substances from the coal gas plants and coke ovens. These represent quite an important field of chemistry. Therefore, it may be suggested that the articles be taken up as follows:

### *Solid Fuels:*

Charcoal  
Coal  
Anthracite  
Bituminous Coal  
Tar  
Lignite  
Coal Tar  
Coke  
Peat

### *Liquid Fuels:*

Alcohol

Petroleum

Kerosene

Oil

*Gaseous Fuels:*

Gas, Illuminating and Fuel

Acetylene

Calcium Carbide

Gas Engine

Internal Combustion Engine

Motor Vehicle

**WATER.**

The Industrial Chemist after fuel is next concerned with Water. It may be hard or soft, saline or alkaline, suitable or unsuitable for use in a boiler, or having special properties making it desirable in the manufacture of such beverages as beer and ale. Its purification may require a wide range of special processes ranging from chlorination to distillation. Accordingly, a suitable line of reading would be somewhat as follows:

Water

Water Supply

Water Purification

Water Works

Distillation

Filter and Filtration

Boiler

Boiling Point

Mineral Waters

Bottling

**COMMON CHEMICALS.**

In Industrial Chemistry there are a number of rather common chemicals, but with a vast economic importance, for they enter so largely into manufacturing that they are always in constant demand and use. A few of these groups may be studied at some length. Thus—Sulphur, whose mining, extrac-

tion and purification are all problems in chemical engineering, has a number of important compounds, of which the best known industrially are found in the accompanying list:

Sulphur

Sulphureted Hydrogen

Sulphuric Acid

Sulphurous Acid

Thiosulphuric Acid

Found widely in nature, SALT is an important substance and common salt or Sodium Chloride is used not only for food, but in the manufacture of Soda Ash, Sodium Carbonate, and other substances. Consequently, the articles

Sodium

Salt

Soda

should be read, it being noted that under these a number of Sodium compounds are treated.

The Chlorine industry involves the preparation of substances used extensively in the arts as a bleaching or oxidizing agent, and the liquid chlorine in addition has been employed extensively as an asphyxiant in the great European War. See:

Chlorine

Chloric Acid

Chlorites

Chlorimetry

Hydrochloric Acid

Hypochlorous Acid

Sal Ammoniac

Mercuric Chloride

Mercurous Chloride

Bleaching Powder

Chloridizing

Chlorination

The various compounds of calcium supply to the arts a large number of important materials, including **MARBLE** and other **BUILDING STONES**, **LIME-STONE** for iron and lead smelting, **GYPNUM** or **PLASTER OF PARIS** (Lime Sulphate), **CEMENT**, in which Lime is the principal ingredient, **BLEACHING POWDER** or **CHLORIDE OF LIME**, **MORTAR**, in which Lime enters largely, and so on through an extensive list. In practically all of these purposes there is work for the industrial chemist, whether it involves the calcining of the material in a kiln to form cement or the study of concrete, now used so largely for structural work. Consequently, the reader who follows through the various articles on Calcium and its compounds as given below will realize their industrial importance:

Lime  
Limestone  
Marble  
Building Stone  
Marl  
Chalk  
Calcite  
Iceland Spar  
Gypsum (Lime Sulphate)  
Bleaching Powder (Lime Chloride)  
Cement  
Kiln  
Mortar  
Concrete  
Masonry  
Plaster of Paris  
Plaster, Lathing and Plastering  
Calcium Carbide  
Fertilizers  
Manures and Manuring  
Iron and Steel, Metallurgy of  
The Destructive Distillation of wood

affords a number of important products, among which is acetic acid, largely used in the manufacture of acetates. There are also a number of other or related substances, so that if we examine a rather broad group we find a number of valuable materials included. These may be embraced in the following list:

Distillation  
Acetic Acid  
Acetine  
Methyl Alcohol  
Tar

The Destructive Distillation and other treatment of bones also affords useful chemical products. The use of bone products as fertilizers, the employment of bone black as a decolorizing agent in filtration, as in sugar refining, are specially important. The connection tissue in skin and bones is used in making gelatine, and the bones themselves are employed in making glue. Accordingly, if the articles enumerated below be consulted a substantial idea of this field of chemical technology will be gained:

Bone  
Bone Black  
Bone Fertilizers  
Gelatin  
Glue

The industrial chemist has important work in connection with the manufacture of various artificial fertilizers which modern intensive agriculture demands. Naturally, this branch is closely connected with scientific agriculture and agricultural chemistry. Consequently, one will find in the accompanying list of articles much that will indicate how the chemist is assist-

ing the processes of nature. Such articles would be :

Manures and Manuring  
Bone Fertilizers  
Peat  
Ashes  
Phosphate  
Potash  
Kelp  
Cyanamid

#### INORGANIC INDUSTRIES.

In Industrial Chemistry the great division of inorganic and organic chemistry can be observed in considering the products of various industries. A certain number containing various groups have been entered specifically on these lists, but the main topics involved can be indicated together and then the reader can pursue his investigations further, depending both on the list in this Guide and on the elaborate cross references given with the articles. Under Inorganic Chemistry reference profitably can be made to the following main and more prominent articles :

Sulphur  
Sulphuric Acid  
Salt  
Hydrochloric Acid  
Soda  
Sodium  
Chlorine  
Nitric Acid  
Ammonia  
Potash  
Bromide  
Iodine  
Phosphorous  
Boric Acid  
Arsenic  
Oxygen

Peroxides  
Sulphates  
Alum  
Cyanides  
Carbon  
Carbon Disulphide  
Carbon Monoxide

#### MINERAL COLORS.

An important series of industries in Inorganic Chemistry involve the manufacture of pigments. The various chemicals entering into the more important of the pigments are discussed largely under MINERAL COLORS and separately as follows :

##### White :

White Lead  
White Chalk  
Lithopone  
Gypsum  
China Clay

##### Blue :

Ultramarine  
Smaltite  
Copper Indigo

##### Green :

Ultramarine  
Brunswick Green  
Chrome Green  
Malachite Green  
Verdigris  
Paris Green

##### Yellow :

Chrome Yellows  
Cadmium  
Litharge  
Gamboge  
Indian Yellow or Purree

##### Orange :

Chrome Orange

**Red:**

Red Lead  
 Chrome Red  
 Red Ochre  
 Vermilion  
 Realgar  
 Antimony Red  
 Carmine

**Brown:**

Umber  
 Sepia

**Black:**

Lampblack  
 Bone Black  
 Charcoal  
 Graphite

**ORGANIC INDUSTRIES.**

Industrial Chemistry is so closely connected with manufacturing and manufacturing processes that in any classification such as could be observed in an encyclopædia, it is very difficult to draw any satisfactory line of demarkation. Particularly is this the case in the large number of industries where organic chemistry plays an important part and underlies the various processes of manufacture.

Accordingly, the reader should refer to the chapter on MANUFACTURES AND ENGINEERING, where, under these various industries and products often the chemical technology is discussed. Such a list of organic industries would be as follows:

Distillation  
 Gas, Illuminating and Fuel  
 Coal Tar  
 Coal-Tar Colors  
 Mineral Oils

**Petroleum**

Waxes  
 Fats  
 Oils  
 Soap  
 Candle  
 Glycerine  
 Gums  
 Resins  
 Starch  
 Dextrin  
 Glucose  
 Sugar  
 Fermentation  
 Distilled Liquors  
 Beer  
 Brewing  
 Explosives  
 Fibres  
 Dyeing  
 Paper  
 Leather  
 Gluc

**MINERAL OILS.**

The preparation and refining of Mineral Oils has produced a wealth of materials aside from the fuel oils proper, and one interested in this field after reading the comprehensive discussion on PETROLEUM will turn to other articles dealing with allied topics, as contained in the accompanying list:

Petroleum  
 Naphtha  
 Paraffin  
 Petrolatum  
 Vaseline  
 Shale Oil  
 Ozokerite  
 Mineral Tallow  
 Asphalt

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## Chapter 20. Home Economics and Domestic Science

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**I**T is but natural that the modern tendency to secure increased efficiency and, consequently, increased comfort and convenience should be manifested in the home through the application of scientific management and devices no less than in commerce and industry. In its latest aspects this finds full expression in the NEW INTERNATIONAL ENCYCLOPÆDIA.

Modern science has done much for the housekeeper, securing more nourishing and more economical foods, as well as as various labor-saving devices—such as SEWING MACHINES and VACUUM CLEANERS—that materially cut down the effort necessary to maintain and operate a domestic establishment. This concerns the small as well as the large householder, for electric light, gas heating and plumbing are all but universally found, and economic methods have been devised for the small city apartment or the isolated farm whereby the maximum well-being, comfort and economies generally can be obtained.

Modern *home economics* is not concerned alone with Food and its Preparation. The intelligent woman of to-day, managing a home, often arranges for its building, for the carpentry, heating, plumbing, wall paper, furniture and carpets and rugs, or for its lease if a rented dwelling, or a portion of an apartment house or hotel. If sufficiently large, the dwelling may involve electric heating, including electric cooking, vacuum cleaners or laundry machines, and in many of the modern homes may involve an organization as complex as a small business, and this involves a number of employees—male and female—to whom the principles of Master and Servant must apply. In a large part, however, Domestic Science has to do with food and its preparation, for it is here that the chemistry of nutrition has been brought to bear, and the wholesome and economical preparation of food is one of the main objects of the modern science of Household Chemistry.

Considering, therefore, the articles already suggested and others arranged in a convenient list for ready reference, we should have first the following, dealing with the home and its material equipment:

House  
Apartment House  
Tenement House  
Hotel  
Building  
Carpentry  
Heating and Ventilation  
Plumbing  
Electric Heater  
Electric Lighting  
Lighting

Illumination  
Vacuum Cleaner  
Water Supply  
Filter and Filtration  
Laundry Machinery  
Sewage Disposal

On the legal side, the householder should know something of the law dealing with such subjects as:

Deed



Title  
Lease  
Master and Servant

Supplied with a proper house and concerned with its management or with the management of an institution where features of home life and home conveniences must apply, one would be concerned with the articles on

Home Economics  
Management, Home and Institution  
Coöperation  
Marketing Associations, Agricultural

It is, however, on food and food supply that intelligent interest centers, for it is here that the high cost of living first makes itself apparent, not to mention that the appetite may prove the shortest road to a man's well being if not to his mind. One concerned with modern scientific food studies realizes that chemistry and physiology figure actively, so that a range of articles are available that are indeed comprehensive.

Food  
Fish as Food  
Diet  
Digestion  
Nutrition  
Infants, Feeding of  
Cookery  
Baking

Sterilized Food  
Packing Industry  
Slaughterhouse  
Adulteration  
Pure-Food Law

Prepared by the preceding rather general articles on Foods and Food-Stuff, the reader in this department will be ready to take up specifically a number of classes of Foods, or, in some cases, definite food substances. Such a list would include the grains and their products:

Barley  
Buckwheat  
Rye  
Wheat  
Maize  
Rice  
Flour  
Bread

There would also be such important foods as

Milk  
Cream  
Butter  
Butter Color  
Butter Making  
Oleomargarine  
Cheese  
Eggs  
Meat  
Meat Extract

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## Chapter 21. Interior Decoration and Decorative Art

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**W**ITHIN a few years there has developed in connection with, yet at the same time apart from, architecture and the fine arts increased interest in those æsthetic forms of expression that are found in the home or dwelling. While always recognized on its artistic side, home decoration has now become a practical art requiring systematic training on the part of those by whom it is practised, and having secured for itself general public recognition as distinct from architecture or mere trade activity in the supply of the articles necessary for the home.

With the growth of civilization the decoration of the home, be it a hut, cave, cottage, or palace, has always appealed directly to its owner or occupants, and their taste has found expression in combining beauty with utility. As a result there is to be seen decorative activity ranging from a most humble scale to securing the work of the greatest artists of the period for ornamental purposes. It is only recently that the proper and most advantageous uses of articles of decorative value have been recognized, and with the growth of luxury and comfort there has been, on the whole, a corresponding growth in good taste. In large part, this has been due either to artist, craftsmen of rare talents or to those who have studied the various æsthetic elements involved in house decoration, recognizing the cardinal principle that a home is designed for habitability. From such study encouraged by museums and collections there has grown up a school of decorative art known as interior decoration, which aims to cultivate public taste to appreciate the artistic and to make the home conform to the accepted canons of good taste, where the work not only of artists but of skilful craftsmen and artisans will be appreciated.

This movement involves both a general manifestation of progressively better taste and the activities of those trained professionally in schools of fine arts or design to practice the art of interior decoration and to advise persons who need such assistance. Just as the ordinary person requires the service of an architect to design or remodel a house or apartment, so when its decoration and furnishing are involved there is no less a call for the services of a trained interior decorator, rather than a mere painter, upholsterer or tradesman. To this profession many women, as well as men, are now devoting themselves with marked success, and to learn of their training and their work one can turn to the article on INTERIOR DECORATION. Here will be found, also, a broad view of the development and scope of the modern art, and if read in connection with the more formal article on DECORATIVE ART, with attention also to ORNAMENT and ARCHITECTURE, a good idea will be gained of the modern status of this important field. Naturally, there are subsidiary to it a number of subordinate articles—thus, FURNITURE is an important part of Interior Decoration, and in its development may be traced the

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general progress of the beautiful with the practical, though retrogression in taste unquestionably is to be noted with the increase of mechanical facility in production and otherwise. Likewise, in CARPETS and RUGS decorative impulse finds expression, and floor coverings represent a wide diversity of artistic ideas, depending upon their service, from the hand looms of the Orient to the modern carpet factory. Again, in the decoration of the surfaces of walls from the older tapestries to the WALL PAPER of the day, a distinct artistic development is represented. In TEXTILE PRINTING also modern art has brought about a wide range of decorative material for the modest householder.

Therefore, with the citation of such main titles, a consideration of a somewhat fuller list will show the interrelation of the articles in this and allied departments, and how advantageously they fit into a comprehensive reading scheme. The list might be taken up in the following order:

Interior Decoration	Veneer
Decorative Art	Wall Paper
Ornament	Paper Hanging
Architecture	Textile Printing
Mural Decoration	Tapestry
Painting	Gobelin
Sculpture	Carpet
Illumination	Rug
Furniture	Lamp
Chippendale Chairs	Lacquer Work
Chippendale, Thomas	Pottery
Hepplewhite, George	Armor
Sheraton, Thomas	Metal Work
Boulle	

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## Chapter 22. Geology

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**G**EOLGY covers a broad field. Its primary object is to explain the origin and development of the earth and the inhabiting life forms. It is concerned thus on the one side with inorganic nature—the character of the materials which constitute the earth's structure, the formation and classification of rocks, the forces of uplift that have produced mountains and continental lands, the agencies that work to modify surface features, the phenomena of earthquakes and volcanoes, and all processes of change operative from the beginning; in another aspect it is allied to the biologic sciences for which it endeavors to find an explanation for the present distribution of plants and animals in the evidences afforded by fossils which have been preserved in the superficial layers of the earth.

Because of its wide scope, geological science has been separated into a number of departments, each with its distinct formations, but none the less closely related to all the others. Of fundamental importance is Petrology, the branch which considers the nature of rocks and the methods of their origin. This branch is one of the last to have attained a real scientific basis. The arrangement of the rocks as they appear at the surface—often quite different from their original attitudes—and the significance of the arrangement in relation to past events, constitute the subject matter of Structural Geology. The great changes which have taken place and are still in progress belong to the field of Dynamical Geology, which considers the action of the atmosphere, water, igneous activity and crustal strains in modifying the earth's features. Its study is essential to the proper understanding of physical geography, particularly the modern development of that subject known as physiography. Consequently the references to physiographic articles will be included under its head. Stratigraphical Geology has for its particular province the investigations of the order and chronological classification of the strata and the study of the geography of the earth in past ages. It has a valuable adjunct in Paleontology, which is the study of fossils and their interpretation in the light of evolution. Geology has many practical bearings, and its application to mining, agriculture and engineering is considered under the head of Economic Geology.

We shall now guide the reader to the articles relating to those several divisions of the subject. For the general article, see GEOLOGY.

### A. Petrology

For the more comprehensive articles in this field, see:

Petrology  
Mineralogy

Crystallography  
Rock

The various large groups or classes of rocks are described under the following titles:

Igneous Rocks  
 Aqueous Rocks  
 Æolian Accumulations  
 Clastic Rocks  
 Plutonic Rocks  
 Metamorphic Rocks  
 Crystalline Rocks  
 Arenaceous Rocks  
 Argillaceous Rocks  
 Calcareous Rocks

For the more important specific kinds of rocks, see:

### 1. IGNEOUS (MASSIVE) ROCKS:

Granite  
 Rhyolite  
 Porphyry  
 Syenite  
 Trachyte  
 Phonolite  
 Diorite  
 Dacite  
 Felsite  
 Gabbro  
 Pyroxenite  
 Hornblendite  
 Peridotite  
 Diabase  
 Basalt  
 Melaphyre  
 Felsite  
 Trap  
 Obsidian  
 Pitchstone  
 Lava  
 Tuff

### 2. SEDIMENTARY (STRATIFIED) ROCKS.

#### (a) *Mechanical Sediments:*

Sand  
 Gravel  
 Sandstone

Conglomerate  
 Breccia  
 Clay  
 Shale  
 Silt  
 Loess  
 Boulder Clay  
 Drift

#### (b) *Chemical Sediments:*

Limestone  
 Dolomite  
 Travertine  
 Gypsum  
 Salt  
 Geyserite  
 Bog-Iron Ore  
 Clay Ironstone

#### (c) *Organic Sediments:*

Limestone  
 Coquina  
 Chalk  
 Coral  
 Marl  
 Diatomaceous Earth  
 Phosphate Rock  
 Peat  
 Lignite  
 Coal

### 3. METAMORPHIC (FOLIATED) ROCKS:

Marble  
 Quartzite  
 Slate  
 Schist  
 Gneiss  
 Amphibolite  
 Mica Schist  
 Eclogite  
 Serpentine  
 Talc  
 Soapstone  
 Chlorite Schist

## **B. Structural Geology**

The broader features of geological structure are described in the articles:

Bed  
Formation  
Conformity  
Unconformity  
Laccolite  
Batholite  
Boss  
Dike  
Sill  
Veins

The smaller elements of structure which pertain to the above larger forms are explained in the articles:

Joints

Foliation  
Lamination  
Schistosity  
Stratification

The effects of uplift and disturbance upon rocks are described in the articles:

Continent  
Mountain  
Anticline  
Syncline  
Monocline  
Dip  
Strike  
Fault  
Clinometer

## **C. Dynamic Geology and Physiography**

The general subject of dynamic agencies operative within the earth is discussed in the articles:

Crust of the Earth  
Elevation and Subsidence  
Metamorphism  
Cataclysm  
Volcano  
Earthquake  
Geyser  
Refrigeration of the Earth

For the evolution of the topography of the earth's surface, see:

Physiography  
Erosion  
Continent  
Island  
River  
Valley  
Plateau  
Lake  
Glacier  
Glacial Period

## **D. Stratigraphical Geology**

The rocks composing the outer solid structure of the earth are separated according to their position and relative age into large divisions which are

designated as groups. Each group represents a long interval of time or era during which the strata were accumulated. The different groups and

their corresponding eras are described under:

Archeozoic Era  
 Proterozoic Era  
 Paleozoic  
 Mesozoic Era  
 Cenozoic

These main divisions are further subdivided into systems, or, according to the time element, into periods. The several systems are described in the following articles:

1. *Archeozoic and Proterozoic:*

Pre-Cambrian Formations

2. *Paleozoic:*

Cambrian System  
 Ordovician  
 Silurian System  
 Devonian System  
 Carboniferous System  
 Permian System

3. *Mesozoic:*

Triassic System  
 Jurassic System  
 Cretaceous System

4. *Cenozoic:*

Tertiary System  
 Quaternary System

The broader scheme of classification as outlined above is of general application. Further subdivision becomes necessary in the study of particular areas, for the individual strata change in character and often in fossil content, as they are traced from place to place. To identify the minor units, geologists usually employ local names

which have currency only within a single country or among such countries as have very similar stratigraphic development. Some of the more important minor divisions in the United States are described in the articles:

*Pre-Cambrian:*

Keweenaw Series

*Cambrian:*

Potsdam Sandstone

*Ordovician:*

Calciferous  
 Trenton  
 Hudson River Beds

*Silurian:*

Medina Series  
 Clinton Stage  
 Niagara Series  
 Salina Stage

*Devonian:*

Oriskany  
 Lower Helderberg  
 Chemung Formation  
 Catskill Formation

*Carboniferous:*

Millstone Grit  
 Pottsville Conglomerate  
 Burlington Limestone

*Triassic:*

Newark Series

*Jurassic:*

Liassic  
 Oolite

*Cretaceous:*

Potomac Formation  
 Dakota Stage  
 Niobrara Stage  
 Laramie Stage

*Tertiary:*

Eocene Epoch  
Oligocene Epoch  
Miocene Epoch  
Pliocene Epoch

*Quaternary:*

Columbia Series  
Drift  
Glacial Period  
Recent Period

## *E. Paleontological Geology*

Paleontology is the study of the nature and distribution of the life forms imbedded in the rocks of the earth's crust. Viewed from the standpoint of biological science, it is a part of zoology and botany; but it is so intimately connected with the study of the rocks themselves that it may properly be considered a part of geology. The general articles on the subject are:

Paleontology  
Paleobotany  
Fossil  
Fossiliferous Rocks  
Contemporaneity  
Homotaxy  
Ichnology  
Fossil Forests

From a biological point of view, the proper method of classifying fossil forms would naturally follow the same principles that guide the classification of living plants and animals. But in studying paleontology as a part of geology, the geological classification is preferable; indeed, the two systems would, to a certain extent, coincide. We shall, therefore, refer the reader to the characteristic fossils of each geological epoch. Most of the larger classes and orders of fossil forms are still represented by living species, and general discussions of these classes

will be found in the articles given in the chapters on Botany and Zoology.

1. The only fossils found in the Pre-Cambrian Formation are described in the article **ANTIQUOKANIA**:

### 2. CAMBRIAN FOSSILS:

#### (a) *Plants*:

Oldhamia

#### (b) *Animals*:

Protospongia  
Dictyonema  
Agnostus  
Paradoxides  
Dikellocephalus  
Olenellus  
Trilobita  
Lingula  
Obolus  
Hyolithes  
Nautiloidea

### 3. ORDOVICIAN AND SILURIAN FOSSILS:

#### (a) *Invertebrates*:

Brachiospongia  
Stromatopora  
Graptolite  
Monograptus  
Favosites  
Olenus  
Chonetes  
Asaphus  
Polyzoa



Fenestella  
 Atrypa  
 Orthis  
 Spirifer  
 Pentamerus  
 Bellerophon  
 Pteropoda  
 Orthoceras  
 Tentaculites  
 Eurypterus

(b) *Fishes*:

Pteraspis  
 Cyathaspis

4. DEVONIAN FOSSILS:

(a) *Invertebrates*:

Atrypa  
 Cyathophyllum  
 Phacops  
 Ammonoidea  
 Pleurotomaria  
 Murchisonia  
 Clymenia  
 Goniatites  
 Bactrites  
 Heliophyllum

(b) *Fishes*:

Holoptychius  
 Osteolepis  
 Dipterus  
 Coccosteus  
 Dinichthys  
 Cephalaspis  
 Chirolepis

5. CARBONIFEROUS FOSSILS:

(a) *Plants*:

Neuropteris  
 Calamites  
 Asterophyllites  
 Annularia

Lepidodendron  
 Sigillaria  
 Stigmaria  
 Cordaites  
 Carpolith  
 Trigonocarpus

(b) *Invertebrates*:

Fusulina  
 Chonetes  
 Productus  
 Proetus  
 Eurypterus

(c) *Fishes*:

Megalichthys  
 Cestraciont

(d) *Reptiles*:

Stegocephalia

6. PERMIAN FOSSILS:

(a) *Fishes*:

Palæoniscus

(b) *Reptiles*:

Rhynchocephalia

7. TRIASSIC FOSSILS:

(a) *Plants*:

Equisetum  
 Cycadaceæ

(b) *Invertebrates*:

Terebratula  
 Ceratites  
 Ammonites

(c) *Reptiles*:

Mastodonsaurus  
 Theromorpha  
 Dinosauria  
 Anchisaurus  
 Labyrinthodon  
 Dicynodon

*(d) Mammals:*

Microlestes

Microconodon

Iguanodon

Mosasauria

Elasmosaurus

Hadrosaurus

## 8. JURASSIC FOSSILS:

*(a) Invertebrates:*

Gryphæa

Trigonia

Belemnites

*(c) Birds:*

Bird, Fossil

Hesperornis

Ichthyornis

*(b) Fishes:*

Chondrosteus

Hybodus

## 10. EOCENE FOSSILS:

*(a) Invertebrates:*

Nummulites

*(c) Reptiles:*

Teleosaurus

Ichthyosaurus

Plesiosaurus

Pterodactyl

Dimorphodon

Diplodocus

Megalosaurus

Brontosaurus

Stegosaurus

Titanosaurus

Cynognathus

Baptanodon

Camptosaurus

Ceratosaurus

*(b) Reptiles:*

Zeuglodon

*(c) Mammals:*

Coryphodon

Hyracotherium

Horse, Fossil

Palæotherium

Anchitherium

Anoplotherium

Lophiodon

Creodonta

*(d) Birds:*

Archæopteryx

*(e) Mammals:*

Ctenacodon

## 9. CRETACEOUS FOSSILS:

*(a) Invertebrates:*

Foraminifera

Globigerina

Ventriculites

Hippurites

Radiolites

Inoceramus

*(b) Reptiles:*

Chelonia

## 11. MIOCENE FOSSILS:

*(a) Mammals:*

Mastodon

Dinotherium

Helladotherium

Machærodus

Elotherium

Halitherium

Hyracodon

Oreodon

Titanotherium

## 12. PLIOCENE FOSSILS:

*(a) Plant:*

Dæmonelix

*(b) Mammals:*

Sivatherium

Hipparion  
Sabre-Toothed Tiger

### 13. QUATERNARY FOSSILS:

#### (a) *Birds*:

Æpyornis  
Moa

#### (b) *Mammals*:

Elasmotherium  
Megatherium  
Glyptodon  
Diprotodon  
Mammoth  
Mastodon  
Pithecanthropus

## F. Economic Geology

This department considers the application of geological facts and principles to industry and technology. The service of geology to mining is especially important and has been recognized very generally by the organization of public surveys to furnish information about the occurrence and distribution of the mineral resources. With this function is usually combined the study of underground waters, a branch that has gained prominence quite recently through the development of the arid tracts of the western United States. Geology also affords useful guidance in the conduct of engineering construction, and of course is the basis for the investigation of the formation and distribution of soils.

The mineral materials that find employment in the arts or industry are of great variety and exhibit wide differences in their methods of occurrence. Some are used in the form in which they exist in nature, or require only a mechanical process of purification or preparation. Such are exemplified by building stones and coal. A large class of minerals, however, have no value in their natural state, but contain valuable elements that can only be released by some metallurgical or chemical treatment. They are illus-

trated by the compounds containing metals, which in their natural state are called ores. The mode of occurrence of the ores, as well as of the non-metalliferous minerals, is the proper field of study of Economic Geology, while the methods employed in their production belong to Mining and Metallurgy.

I. The forms and occurrence of the larger rock masses have already been referred to under Petrology and Structural Geology. The other non-metallic substances will be described in the articles on each specific substance. It is, therefore, only necessary to give as introductory articles those descriptive of the occurrence of the ores. See:

Ore  
Ore Deposits  
Gangue  
Footwall  
Hanging Wall  
Pinch  
Dike  
Vein  
Lode

### II. THE METALLIFEROUS ORES:

#### 1. *Iron Ores*:

Limonite  
Hematite  
Magnetite

Siderite  
Franklinite  
Bog-Iron Ore  
Blackband Ironstone  
Pyrite  
Pea Ore

2. *Gold Ores:*

Gold  
Calaverite  
Hessite

3. *Platinum*

4. *Silver Ores:*

Silver  
Argentite  
Pyrargyrite  
Cerargyrite  
Proustite  
Stephanite

5. *Copper Ores:*

Chalcopyrite  
Cuprite  
Malachite

6. *Lead Ores:*

Galena  
Anglesite  
Cerusite  
Pyromorphite

7. *Zinc Ores:*

Blende  
Willemite  
Zincite  
Franklinite  
Smithsonite  
Calamine

8. *Mercury Ores:*

Cinnabar  
Calomel

9. *Manganese Ores:*

Pyrolusite

Manganite

Psilomelane

10. *Aluminum Ores:*

Cryolite  
Gibbsite  
Bauxite

11. *Tin Ore:*

Cassiterite

12. *Nickel Ores:*

Millerite  
Pyrrhotite

13. *Antimony Ore:*

Stibnite

III. THE CARBON MINERALS:

1. Coal

Anthracite  
Bituminous Coal  
Jet  
Lignite  
Torbanite  
Peat

2. Petroleum

Gas, Natural

3. Asphalt

Bitumen  
Albertite  
Grahamite  
Gilsonite  
Maltha

4. Ozocerite

Asphaltic Coal  
Mineral Tallow

5. Graphite

IV. BUILDING MATERIALS:

Building Stone

Granite

Sandstone

Limestone  
 Freestone  
 Marble  
 Onyx Marble  
 Flagstone  
 Caithness Flagstone  
 Slate  
 Bath Stone  
 Caen Stone  
 Brownstone  
 Puzzuolana

#### V. SOILS, CLAYS, FERTILIZERS, AND WATERS:

1. Humus  
    Soil  
    Loam  
    Loess
2. Clay  
    Potters' Clay  
    Fire Clay  
    Pipe Clay  
    Brick Clay  
    Kaolin
3. Gypsum  
    Apatite  
    Phosphorite  
    Marl  
    Guano
4. Mineral Waters  
    Spring  
    Artesian Wells

#### VI. SALTS:

Salt  
 Bay Salt  
 Borax  
 Bromine  
 Iodine

#### VII. PRECIOUS STONES:

Diamond

Corundum  
 Quartz  
 Emerald  
 Ruby  
 Beryl  
 Chrysoberyl  
 Sapphire  
 Aquamarine  
 Tourmaline  
 Spodumene  
 Amethyst  
 Opal  
 Alabaster  
 Chalcedony  
 Carnelian  
 Sardonyx  
 Aragonite  
 Agate  
 Jasper  
 Chrysolite  
 Turquoise  
 Topaz  
 Garnet  
 Rhodonite  
 Chrysocolla  
 Catlinite  
 Benitoite  
 Smithsonianite

#### VIII. ABRASIVES:

Abrasives  
 Diamond  
 Grindstone  
 Buhrstone  
 Oil-Stone  
 Novaculite  
 Emery  
 Corundum  
 Carborundum  
 Garnet  
 Diatomaceous Earth  
 Tripolite  
 Pumice

## IX. PIGMENTS:

Mineral Paints  
Graphite  
Ochre  
Umber  
Burnt Sienna  
Chalk  
Hematite  
Slate

Solenhofen Lithographic Stone

Talc  
Soapstone  
Mica  
Feldspar  
Fluorite  
Sulphur  
Asbestic  
Asbestos  
Magnesite  
Fuller's Earth  
Monazite

## X. MINERALS USED IN VARIOUS ARTS:

Lithographic Stone

## G. Biographies of Eminent Geologists

Barrande, J.  
Beyrich, H. E. B.  
Bishop, K. G.  
Brongniart, A.  
Buch, L. von  
Buckland, W.  
Chamberlin, T. C.  
Conybeare, W. D.  
Cope, E. D.  
Cotta, B. von  
Dana, J. D.  
Darwin, Charles  
Daubrée, G. A.  
Dawson, Sir J. W.  
De la Beche, Sir H. T.  
Elie de Beaumont, J. B.  
Eichwald, K. E.  
Emmons, E.  
Forbes, J. D.  
Gaudry, A.  
Geer, G. de  
Geikie, Sir Archibald  
Goldfuss, G. A.  
Hall, Sir James  
Hall, James  
Hayden, F. V.  
Heer, O.  
Heim, A.

Hitchcock, E.  
Humboldt, F. H. A. von  
Hutton, J.  
Koninck, L. G.  
Lapparent, A. A. C. de  
Lea, I.  
Le Conte, J.  
Logan, Sir William  
Lyell, Sir Charles  
Marcou, J.  
Marsh, O. C.  
Miller, H.  
Mojsisovics, E. von  
Murchison, Sir R. I.  
Newberry, J. S.  
Orbigny, A. D. d'  
Owen, Sir R.  
Phillips, J.  
Playfair John  
Powell, J. W.  
Prestwich, Sir Joseph  
Ramsay, Sir A. C.  
Roemer, F. A.  
Rosenbusch, H.  
Saussure, H. B. de  
Schimper, W. P.  
Sedgwick, A.  
Silliman, B.

**Smith, W.**

**Sowerby, J.**

**Strickland, H. E.**

**Suess, Eduard**

**Unger, F.**

**Werner, A. G.**

**Winchell, A.**

**Woodward, S. P.**

**Zittel, K. A. von**

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# Chapter 23. Meteorology

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**M**ETEOROLOGY is the study of the atmosphere, its static conditions and appearances, and the changes and movements of all kinds which take place in it. The two principal constituents of the atmosphere are the air and the moisture in various forms which the air holds in suspension. Weather and climate are principally determined by the conditions under which these two constituents exist, at any particular time or habitually. The static conditions of the air which mainly affect the weather are its temperature and its pressure; its movements come under the general term wind. The moisture of the atmosphere, unlike the bulk of the air, is continually changing its identity. It is raised from surface waters by evaporation, held for a time in suspension under various forms, and then returned to the earth's surface by various modes of precipitation.

Besides these two sets of phenomena, the electrical conditions of the atmosphere form an important element of the weather. Other causes sometimes bring about peculiar or unusual weather conditions, and, aside from weather in its strict sense, meteorology takes cognizance of the peculiar optical appearances which the atmosphere presents. These considerations, together with the fact that the practical aspects and practical rather than theoretical investigations hold, perhaps, a more prominent place in meteorology than in other natural sciences, serve to indicate the main divisions of the subject. A considerable number of instruments are used in meteorological investigations, and the articles describing these will be referred to in connection with the appropriate subdivision.

## I. GENERAL PRINCIPLES OF THE SCIENCE. See:

Meteorology  
Atmosphere  
Polarization of Sky Light  
Dust  
Climate  
Weather

2. The instruments used in measuring temperature and radiation are described under:

Thermometer  
Actinometer  
Actinograph  
Radiometer  
Pyrheliometer

## II. TEMPERATURE AND PRESSURE.

1. The theory and investigation of temperature and its causes are treated under:

Temperature, Terrestrial  
Cold Wave  
Frost  
Snow Line  
Actinometry  
Thermometry  
Seasons

3. For atmospheric pressure and the instruments used in measuring it, see:  
Barometer

## III. WINDS.

1. There are certain general forms of wind movements recognized without reference to localities. See:

Wind  
Storm  
Whirlwind



Tornado

Waterspout

Gale

2. On the other hand, in certain parts of the world peculiar local conditions produce winds which have received local names. See:

Doldrums

Calm Latitudes

Blizzard

Chinook

Etesian Winds

Harmattan

Hurricane

Mistral

Sirocco

Monsoon

Simoom

Equinoctial Storm

3. For the instruments and methods used in measuring or observing the winds, see:

Anemometer

Anemograph

Anemoscope

Beaufort Scale

#### IV. EVAPORATION AND PRECIPITATION.

1. See the general article:

Evaporation

2. The various forms in which moisture is held suspended are described under:

Humidity

Haze

Fog

Cloud

3. For the various forms of precipitation, see:

Dew

Hoar Frost (under Frost)

Rain

Cloudburst

Snow

Hail

4. For the instruments used in measuring or observing the moisture of the atmosphere, see:

Hygrometer

Drosometer

Nephoscope

Rain Gauge

#### V. ELECTRICAL CONDITIONS AFFECTING THE WEATHER. See:

Atmospheric Electricity

Lightning

Lightning, Accidents from

Lightning, Protection from

#### VI. PECULIAR OR UNUSUAL WEATHER CONDITIONS ARE DESCRIBED IN THE ARTICLES:

Dust

Dark Day

Black Rain

Blood-Rain

Indian Summer

#### VII. OTHER PHENOMENA OF THE ATMOSPHERE BELONG MAINLY TO OPTICAL APPEARANCES OR ELECTRICAL DISPLAYS. See:

Rainbow

Fog-Bow

Halo

Scintillation

Mirage

Fata Morgana

Aurora Borealis

Elmo's Fire, Saint

Castor and Pollux

#### VIII. PRACTICAL INVESTIGATIONS IN METEOROLOGY ARE GENERALLY CONDUCTED BY GOVERNMENT BUREAUS. See:

Weather Bureau

Signal Corps, U. S. Army

These bureaus warn the public by a system of signals. See:

Storm and Weather Signals

And in this connection also:

Fog Signals

They also issue daily weather maps.  
See:

Isothermal Lines

Isobarometric Lines

Isograms

Isabnormal Lines

Isanomalous Lines

**IX. FOR BIOGRAPHIES OF THE MOST  
PROMINENT METEOROLOGISTS, see:**

Abbe, Cleveland

Espy, James Pollard

Fonvielle, Wilfrid de

Maury, M. F.

Pernter, J. M.

Wild, H.

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## Chapter 24. Geography

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**G**EOGRAPHY is the description of the surface of the earth in all its aspects. Just as the place where the atmosphere is where the lithosphere meets the hydrosphere, so do the sciences of METEOROLOGY and GEOLOGY meet in that of GEOGRAPHY, and the last to a certain extent encroaches upon the fields of the other two. The subject is very wide, covering a regional study of the upper layers of the earth's crust, a regional study of the atmosphere, or the climatic conditions prevailing on the various parts of the surface. Thus, in the consideration of any region on the earth, we should study the character of the land configurations, the bodies of water (rivers, lakes, seas, etc.) and their influences, the flora and fauna and their relationship to the other physical features, and, finally, the human inhabitants, their character and activities. Of course, we should also consider region as a whole and its relationship to other parts of the earth.

The whole subject may be broadly divided into three main branches: Mathematical Geography, which deals with the form, dimensions, and position of the earth, and the methods of its delineation; Physical Geography, which is a general discussion of the various natural features of the earth's surface, and Political, Regional, or Descriptive Geography, which gives detailed and specific descriptions of the separate parts of the earth's surface, generally as its human inhabitants have divided it among themselves, all their varied activities, and all the artificial changes which they have made, and the structures which they have built.

### A. Mathematical Geography

#### I. GENERAL. See:

Earth  
Pole  
Equator, Terrestrial  
Meridian  
Latitude and Longitude  
Degree of Latitude  
Degree of Longitude  
Tropics  
Geography  
Zone

Globe  
Coast and Geodetic Survey  
Geodesy  
Surveying

#### III. TERRESTRIAL MAGNETISM. See:

Magnetism, Terrestrial  
Declination  
Dip  
Isoclinic  
Isogonic Lines  
Isodynamic Lines  
Compass  
Theodolite  
Sextant

#### II. METHODS OF DELINEATION. See:

Map  
Chart

## B. Physical Geography

Under this head will be given the articles dealing with geographical features that are due to various geological or climatic causes. The articles on the causes themselves are referred to under Geology and Meteorology. At the end of each subdivision are given the articles on the most remarkable examples of the features discussed. In connection with this section the departments of Zoölogy and Botany should also be consulted.

### I. GENERAL ARTICLE. See:

Physiography

### II. OCEANOGRAPHY:

Oceanography  
Ocean  
Deep-Sea Exploration  
Sounding  
Abysmal Accumulations  
Oceanic Deposits  
Ocean Currents  
Tides  
Bore  
Channel  
Shore  
Gulf Stream  
Atlantic Ocean  
Pacific Ocean  
Indian Ocean

### III. GENERAL LAND FORMS:

Aiguille  
Archipelago  
Butte  
Cordillera  
Continent  
Island  
Isthmus  
Mountain  
Valley

Plateau  
Sierra  
Basin  
North America  
Australia  
Himalaya  
Malay Archipelago  
Panama, Isthmus of  
Sierra Nevada

### IV. HYDROGRAPHY:

Hydrography  
Bayou  
Bog  
River  
Divide  
Waterfall  
Inundation  
Flood Plain  
Delta  
Reef  
Bar  
Lake  
Floating Island  
Mississippi River  
Amazon River  
Nile  
Great Lakes

### V. GEOGRAPHICAL FEATURES DUE TO MOVEMENTS OF THE EARTH'S CRUST:

Beaches, Raised  
Earthquake  
Estuary  
Fiord  
Coastal Plain  
Great Rift Valley

### VI. FEATURES DUE TO VOLCANIC ACTION:

Volcano  
Crater

Geyser

Dike

Laccolite

Vesuvius

Etna (*Ætna*)

Krakatoa

Pelée, Mont

Hecla

Mauna Loa

Kilauea

Soufrière, La

Popocatepetl

Yellowstone National Park

Palisades

Giant's Causeway

Staffa

#### VII. FEATURES DUE TO EROSION:

Erosion

Piedmont Plain

Bad Lands

Cliff

Talus

River Terraces (under Terrace)

Cañon

Mesa

Sink Hole

Cave

Karst

Delaware Water Gap

Colorado River

Niagara River and Falls

Victoria Falls

Mammoth Cave

Luray Cave

Natural Bridge

Yosemite Valley

#### VIII. FEATURES DUE TO GLACIAL ACTION:

Glacier

Moraine

Iceberg (under Ice)

Avalanche

Drumlin

Eskers

Giants' Kettles

Rocking Stones

Mer de Glace

Gorner Glacier

#### IX. FEATURES DUE TO WIND ACTION:

Dune

Medano

Musical Sand

#### X. FEATURES DUE TO PECULIAR SOIL OR CLIMATIC CONDITIONS:

Desert

Oasis

Prairie

Savannas

Steppe

Tundra

Downs

Llanos

Pampas

Karoo

Sahara

Gobi

#### XI. FEATURES DUE TO THE ACTION OF ANIMALS:

Coral Island

Atoll

Barrier Reef

## C. Political or Regional Geography

This is by far the most important part of geographical study, and, taken as a whole, is probably the largest and most valuable department of the *NEW INTERNATIONAL ENCYCLOPÆDIA*. Lack

of space makes it impracticable to enumerate all of the important articles in the work connected with a study of Political Geography. The next best thing would be an outline of geograph-

ical history and knowledge, which would of itself suggest further fields of investigation.

The earliest geographic knowledge dates back to about 600 B. C. Hecataeus was one of the first cartographers, and at about 500 B. C. made a map of the world as known then, showing the existence of two continents. Herodotus distinguished three continents, Aristotle demonstrated that the world was round, and Eratosthenes computed the length of the earth's circumference to be 25,000 miles. Ptolemy extended the knowledge of the world by a vast amount and drew maps that were used by Columbus over thirteen centuries later.

In the line of exploration, the Phœnicians were the first nation of discoverers. With the Carthaginians and the Egyptians their trading brought them into many unknown regions, which they frequently colonized. The Arabs contributed a large amount of geographic knowledge during the Middle Ages and the Norsemen colonized Iceland and Greenland and explored the northern seas.

The names connected with geographical knowledge up to the fifteenth century, when the period of modern explorations began, are in the following list:

#### I. ANCIENT:

Hecataeus of Miletus  
Herodotus  
Eratosthenes  
Pythagoras  
Ptolemy  
Aristotle  
Strabo  
Tyre  
Pytheas of Marseilles

Alexander the Great  
Masudi  
Edrisi  
Ibn Batuta  
Ericson, Lief  
Benjamin of Tudela

#### II. MEDIEVAL:

Rubruquis  
Polo, Marco  
Clavijo  
Conti, Niccolò dei

Modern exploration dates from the fifteenth century, particularly from the time of Prince Henry of Portugal. The discovery of the Cape of Good Hope and the utilization of the magnetic compass lent impetus to the navigation of the high seas and consequent discoveries. These were at first confined to Africa, in a search for an all-water route to India. Then came Columbus, who discovered the West Indies (America). This marked the beginning of a series of discoveries that resulted in the uncovering of the entire Western Hemisphere and the establishment of the main features of the globe on both land and sea. With this accomplished, the attention of the world turned to the opening up and development of the newly discovered lands. North and South America, Africa, Asia, Australia, and many of the Pacific Islands were all fields of endeavor in the search for growth of trade and wealth. Many places were discovered and explored by men of different countries and disputes frequently arose over their possession. All of the maritime nations, particularly Portugal and Spain, took part, the names of hundreds of men finding their way into the annals of history.

In the following list are men prominent in early exploration and discovery. The names will suggest articles on the regions explored and other places affected.

Men and places involved in early discovery and exploration:

**I. SOUTH AMERICA:**

Pizarro, Francisco  
 Drake, Sir Francis  
 Hawkins, Sir Richard  
 Magalhães, Fernão de

**II. NORTH AMERICA:**

Columbus, Christopher  
 Vespucci, Americus  
 Cabot, John  
 Cabot, Sebastian  
 Balboa, Vasco Nuñez de  
 Cortés, Hernán  
 Soto, Hernando de  
 Cartier, Jacques

**III. AFRICA:**

Cadamosto  
 Días de Novas, Bartholomeu  
 Gama, Vasco da  
 Henry the Navigator

**IV. SOUTH SEA AND PACIFIC OCEAN:**

Tasman, Abel Janszoon  
 Cook, Capt. James  
 Entrecasteaux, Joseph Antoine  
 Bruni, Chevalier d'

Exploration in Africa, at first entirely confined to the Portuguese, became the attention of other nations toward the end of the 18th century, when James Bruce, an Englishman, seeking the source of the Nile, discovered the Blue Nile. He heads a very long list of African explorers, more prominent among whom are Mungo Park, Heinrich Barth, David Living-

stone, H. M. Stanley, Gerhard Rohlfs. There are still parts of this continent, South America and Asia, which are quite unknown. These are slowly being uncovered by men who are accomplishing difficult and arduous tasks with little or no glory.

The main attention of the world in modern times has been directed toward the explorations of the Polar Regions. At first actuated by purely commercial incentives, the efforts of explorers today are directed in the interest of science. The earliest explorations in the North Polar regions, however, were caused by the search for the Northwest Passage to the Orient. The men prominently connected with this in particular were the Cabots, Henry Hudson, Parry, Cook, Rae, Simpson, Franklin and McClure. The Antarctic has received less attention than the northern fields on account of its remoteness, and it is only recently that any valuable work has been done there. In this connection Shackleton, Scott and Amundsen stand out prominently among the few South Polar explorers.

Recent successes in the Polar Regions are directly attributable to the lessons learned in early work there and to the advance in scientific knowledge, which gave to the men advantages never had by early explorers. Both Poles have finally been attained, the North Pole by Peary (April 6, 1909), and the South Pole by Amundsen (December 4, 1911) and Scott (January 18, 1912). See articles POLAR RESEARCH, NORTHWEST PASSAGE.

**POLAR EXPLORERS.** See:

Amundsen, R.  
 Back, G.

Baffin, W.  
 Barents, W.  
 Bering, V.  
 Cook, J.  
 Franklin, J.  
 Greely, A. W.  
 Hudson, H.  
 Kotzebue, O. von  
 McClure, R. J. le M.  
 Mawson, D.  
 Nansen, E.  
 Nordenskiöld, N. A.  
 Parry, W. E.  
 Payer, S.  
 Peary, R. E.  
 Ross, J. C.  
 Ross, J.  
 Scott, R. F.  
 Shackleton, E. H.  
 Stefansson, V.  
 Sverdrup, O.  
 Vancouver, G.  
 Vilkitsky, B. A.  
 Wellman, W.  
 Weyprecht, K.  
 Wilkes, C.

Lack of space forbids anything like an enumeration of even the more important articles describing the various parts of the earth and their inhabitants. The bulk of minor gazetteer articles are intended only for incidental reference, when information about a particular locality is desired. Nevertheless, it would be possible to plan a very instructive and interesting course of systematic reading in descriptive geography.

One way would obviously be to read first the articles on the larger divisions of the earth, EUROPE, ASIA, AFRICA, AMERICA, AUSTRALIA, ARCTIC REGION, and ANTARCTIC REGION, and, in the latter connection, the article on

POLAR RESEARCH. These articles give, besides, a general geographic and ethnographic description, and a history of exploration and discoveries from ancient to recent times. They also refer to the separate divisions of the larger land areas, and, by reference to the articles on these divisions, the reader will be carried successively into narrower and narrower fields with more and more detailed description.

The story of explorations and discoveries, and of the science of geography, may also be carried further by means of the following names and titles:

Andrée, S. A.  
 Baker, S. W.  
 Barth, H.  
 Behaim, M.  
 Borchgrevink, C. E.  
 Brazza, P.  
 Burckhardt, J. L.  
 Burton, R. F.  
 Chancellor, R.  
 Flinders, M.  
 Gray, R.  
 Hakluyt, R.  
 Hedin, Sven  
 Johnston, H. H.  
 Kane, E. K.  
 Kiepert, H.  
 Kingsley, M. H.  
 Kohl, J. G.  
 La Hontan, A. L.  
 Lander, R. L.  
 Lapérouse, J. F.  
 Lockwood, J. B.  
 Major, R. H.  
 Malte-Brun, K.  
 Markham, C. R.  
 Przhevalski, N. M.  
 Ratzel, F.  
 Ravenstein, E. G.



Reclus, E.  
Rennel, J.  
Ritter, K.  
Speke, J. H.  
Sturt, C.

Still another method of carrying on the study of geography would be to study the maps, and, wherever a particular region found there excites the reader's curiosity, turn to the appropriate article. Many other ways will suggest themselves, according to the individual's tastes, inclination, or requirements, and it will be found that an encyclopædia is the best means of gaining, not only a minute knowledge of any particular locality on the earth's

surface, but also a broad perspective view of the whole field of human activity. For the gazetteer articles are not to be regarded merely as dealing with topics in geography. Taking any of the articles on the various countries of the globe, as the UNITED STATES, or JAPAN, such article may be made to supply detailed information on whatever topic may be the subject of study or reading: Zoölogy, Geology, Statistics, Finance, Education, Industry, or Transportation. To quote these articles and the accompanying maps would be to encumber the book with enormous lists of names, which the reader may be trusted readily to select for himself.

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## Chapter 25. Botany

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**B**OTANY is the science that deals with plants in all their aspects,—their origin and development, nature, structure, life processes, classification, and distribution. The nature and origin of plants will be discussed in the general articles given below. All considerations of the form and structure of individual plants may be broadly classed under the general term Structural Botany, or Plant Anatomy. The study of the processes which constitute the life of a plant and the conditions which affect those processes is called Physiology. These two branches of the science are sometimes united under the term General Botany, as distinct from Specific or Systematic Botany, also called Taxonomy, which deals with the classification and description of the various kinds of plants. A somewhat recently established branch of the science is that of Ecology, which deals with the distribution of plants in general. Another branch represents the practical aspects of botany by a particular investigation of the plants which can be made to enter into human economy. This is Economic Botany, the science which has the closest bearing on the arts of agriculture and horticulture. For a general discussion of botanical science, see:

Botany  
Biology  
Evolution  
Heredity

Botanical Laboratories (under Laboratory)  
Botanic Garden  
Herbarium  
Index Kewensis

For General Methods of Botanical Investigation, see:

### A. Structural Botany

This subject deals with the form and structure of individual plants, of the plant body as a whole, of its separate limbs and organs, of the various tissues of which these are composed, and of the minute structures of the cells which compose the tissues. The study of the individual cell has recently received so much attention that it has been elevated from a branch of Histology, which deals with the microscopic nature of tissues, to the separate science of Cytology. The study of the varying types of organs has been called Morphology, and this branch may be

divided into the morphology of the sterile or vegetative organs and the morphology of the reproductive organs.

For General Articles on Structural Botany, see:

Vegetable Tissue  
Anatomy of Plants  
Growth (in Plants)  
Morphology

**I. CYTOLOGY.** A description of the general structure and contents of the cell is given in the articles:

Cytology

Cell (in Plants)  
 Intercellular System  
 Protoplasm  
 Nucleus  
 Osmosis  
 Plasmolysis  
 Movement  
 Rotation

For the composition of the cell wall, see:

Cellulose  
 Lignin  
 Lignification  
 Micellar Theory

For the structure of the nucleus, see:

Nucleolus  
 Linin  
 Chromatin  
 Chromosome  
 Centrosome

For the cytoplasm, see:

Microsome  
 Plastids

The protoplasmic contents include a considerable variety of coloring matter. See:

Color in Plants  
 Chromoplast  
 Chromatophore  
 Endochrome  
 Chloroplast  
 Anthocyan  
 Chlorophyll  
 Leucoplasts  
 Elaioplasts  
 Erythrophyll  
 Etiolin  
 Etiolation  
 Carotin  
 Cyanophyll  
 Phycoerythrin

Phycophaein  
 Pyrenoid

Besides the protoplasm the cell often contains crystals and other bodies.

See:

Raphides  
 Aleurone  
 Inulin  
 Starch

Finally the various constituents of the sap, digestive ferments, and secretions:

Sap  
 Sugar  
 Glucose  
 Enzyme  
 Diastase  
 Cytase  
 Lipase  
 Invertase  
 Oxidase  
 Pectase  
 Zymase  
 Latex

The mechanics of cell division are described under:

Mechanics of Development  
 Fission  
 Mitosis  
 Karyokinesis  
 Blepharoplast

II. HISTOLOGY. A general discussion of plant tissues is given in the article HISTOLOGY, section on *Histology of Plants*.

Tissues are variously classified. According to their general nature, the two most important kinds are described under:

Parenchyma  
 Collenchyma

In higher plants, the tissues are gen-

erally differentiated into three main systems. See:

Pith  
Wood  
Cortex

The general articles on woody tissue are:

Alburnum  
Duramen  
Vascular Tissue  
Conducting Tissue  
Mechanical Tissue  
Mestome  
Plerome

For the special structure of wood, see:

Fibrovascular Bundle  
Fibre  
Phloem  
Bast  
Hadrome  
Leptome  
Tylosis  
Tracheæ (under Anatomy of Plants)  
Tracheid  
Sieve Vessels  
Cambium  
Pericycle  
Medullary Ray

The various tissues found in the cortex are described in the articles:

Meristem  
Epidermis  
Cuticle  
Endodermis  
Hypodermis  
Periblem  
Dermatogen  
Bark  
Cork  
Phelloderm  
Phellogen

Other special forms of tissue are:

Aërenchyma  
Palisade Cells  
Mesophyll

### III. MORPHOLOGY OF THE VEGETATIVE ORGANS.

For the general forms of plant bodies, see:

Thallus  
Herb  
Shrubs  
Tree  
Juvenile Forms

Some of the special forms or organs of fungi are described under:

Hypha  
Mycelium  
Plasmodium  
Pileus

Higher plants are generally differentiated into stem, root, and leaves, all of which may carry minor organs or appendages. See:

Stem  
Root  
Leaf

For special forms of stems, see:

Tuber  
Corm  
Internode  
Fasciation  
Phylloclad

For their mode of branching:

Branching  
Monopodial Branching  
Dichotomy

For the forms and appearance of leaves, see:

Fronde  
Pinnule  
Phyllodes

Petiole  
 Venation  
 Variegation  
 Anisophylly  
 Heterophylly

For their arrangement in the bud,  
 see:

Leaf-Buds (under Bud)

The forms and appendages of the  
 roots are described in the articles:

Root  
 Rhizoids  
 Root Tubercles

For the organs of respiration and  
 exudation, see:

The Aërating System (under Anat-  
 omy of Plants)

Stomata  
 Lenticels  
 Hydathode

For the organs of support and sim-  
 ilar use, see:

Tendrils  
 Haustoria

Other appendages of plants are de-  
 scribed under:

Trichome  
 Gland  
 Cilia of Plants  
 Bloom

#### IV. MORPHOLOGY OF THE REPRO- DUCTIVE ORGANS.

The vast majority of plants produce  
 at certain periods of their life-history  
 two sets of reproductive organs, the  
 sexual and the asexual; and, in all  
 plants above the algæ and fungi, these  
 follow each other regularly in alter-  
 nate generations. (See the general  
 articles on sexual processes referred to  
 under Physiology.) In this section,  
 only those articles will be given which

describe the sexual and asexual repro-  
 ductive organs. These organs are  
 present in some form throughout large  
 classes of plants. Special morphology  
 will be discussed under the appropriate  
 heads in Systematic Botany.

Asexual reproduction is effected by  
 spores and by vegetative off-shoots.  
 For the latter, see:

Bud  
 Gemma  
 Bulb

For the organs of spore-reproduc-  
 tion, see:

Spore  
 Intine  
 Homospory  
 Heterospory  
 Microspore  
 Megaspore  
 Sporangium  
 Microsporangium  
 Megasporangium  
 Sporophyll  
 Microsporophyll  
 Megasporophyll

The organs of sexual reproduction  
 are:

Gamete  
 Generative Cell  
 Oöspere  
 Sperm  
 Antheridium  
 Archegonium  
 Oögonium  
 Paraphyses  
 Oöspore

In the higher plants (Spermato-  
 phytes), the two sets of reproductive  
 organs, sexual and asexual, are enclosed  
 together in the flower. See:

Flower  
 Seed  
 Fruit

For the various modes in which flowers are arranged on the plant, see :

Inflorescence  
Panicle  
Cyme  
Corymb  
Ament  
Disk

The parts of a flower are described in the articles :

Involucre  
Calyx  
Pappus  
Corolla  
Petal  
Ligule  
Nectary  
Pistil  
Ovary  
Carpel  
Ovule  
Placenta  
Stamen  
Anther  
Pollen

Epigyny  
Hypogyny  
Perigyny

The articles on the seed are :

Seed  
Endosperm  
Perisperm  
Ovule  
Nucellus  
Embryo  
Suspensor  
Cotyledon  
Hypocotyl

For the various kinds of fruits, see :

Achene  
Berry  
Capsule  
Caryopsis  
Drupe  
Drupelet  
Follicle  
Glume  
Legume  
Nut  
Pome

## B. Physiology

Physiology is the science which deals with all the processes that constitute the life of an individual plant, the conditions, both internal and external, which affect plant life, and all the phenomena attending such processes and conditions. Just as we distinguish between vegetative and reproductive organs of a plant, so we may also distinguish between vegetative and reproductive life processes; and the former may be divided into the regular and constant processes, which maintain the

life of a plant, and the more occasional responses to stimuli. Abnormal and pathological conditions also come within the scope of physiology. See **PHYSIOLOGY OF PLANTS.**

I. In all perfect plants, there is a series of regular mechanical processes by which raw food material is brought to the digestive organs in the form of gases from the atmosphere, or of minerals dissolved in water from the soil; by other processes the digested food is carried to places of storage or growing

points, and the waste products are expelled from the system. See:

Respiration (in plants)

Aëration

Absorption (in plants)

Transpiration

Potometer

Imbibition

Osmosis

Turgor

Root Pressure

Conduction

Storage

Excretion

Secretion (vegetable)

II. The phenomena of digestion and growth are described in the articles:

Digestion in Plants

Food of Plants

Nutrition (in plants)

Mycorrhiza

Photosynthesis

Etiolation

Metabolism

Katabolism

Anabolism

Fermentation

Assimilation

Regeneration

Parasite, Plant

Saprophyte

Carnivorous Plants

Insectivorous Plants

Energy of Plants

Growth (in plants)

Auxanometer

Enzymes

Chloroplasts

Carotin

Etiolin

The various movements which plants are capable of are described under:

Movement

Moving Plant

Motor Organ

Locomotion

Nutation (in plants)

Plants are also capable of reacting to a great variety of stimuli. See:

Irritability

Stimulus

Tropism

Phototaxis

Heliotropism

Photoepinasty

Apheliotropism

Paraheliotropism

Nyctotropic

Sleep of Plants

Geotropism in Plants

Apogcotropism

Diageotropism

Hydrotropism

Aphydrotropism

Aërotropism

Rheotropism

Thermotropism

Chemotaxis

Chemotropism

Electrotaxis

Electrotropism

Traumatropism

Sensitive Plant

Hyponasty

Epinasty

Clinostat

Tendrils

Lianas

Reproductive processes may be divided into those which take place within the individual plant, and those which are affected by the relation of the individual plant to its environment. The latter are referred to under Ecology (see C below), while only the former are described in the following articles:

Reproduction (in plants)

Vegetative Propagation

**Sex in Plants (under Sex)**

Conjugation

Rejuvenescence

Isogamy

Apogamy

Parthenogenesis

Vivipary

Fertilization

Germination

Alternation of Generations

Gametophyte

Sporophyte

A discussion of the abnormal and pathological in plant life is given in the articles:

Teratology

Monstrosity

Malformation

Abortion in Plants (under Abortion)

Vestigial Structures

Concrescence

Galls

## C. Ecology

Ecology is the science that deals with the relation of a plant to its environment. This relation may be that of sexual intercourse, relation to the soil, situation, climate, moisture conditions, relation to other plants and to animals, and any other external conditions that affect the situation of a plant, its growth, or the length of its life, either in the individual or in the species or race. Ecology is thus the study of the distribution of plants in the broadest sense. See:

Ecology

Distribution of Plants

Bionomics

Floristics

Dysteleology

Adaptation

Epharmony

1. The relations of the reproductive functions of a plant to the environment are discussed in the articles:

Pollination

Pollen

Hybrid

Dispersal

The special arrangements which

affect cross-pollination are described under:

Cleistogamy

Allogamy

Geitonogamy

Monœcism

Diœcism

Dichogamy

Entomophilous Plant

Anemophilous Plants

Hydrophilous

For the relation of plants to the soil, see:

Humus Plants

Lime Plants

Clay-Plants

Nitrophilous Plants

Halophyte

Dune Vegetation

Rock Plants

Epiphyte

For the relation of plants to general localities, see:

Autochthonous

Endemism

Naturalization

Migration of Plants



and, to specific situations:

Mountain Plants

Alpine Plant

Cliff-Plants

Beach Plants

Ruderal Plants

Hylophytes

Benthos

Enalids

Plankton

For the relation of a plant to moisture and climate, see:

Hydrophytes

Hygrophytes

Mesophyte

Amphibious Plants

Xerophytes

Desert Vegetation

Arctic Plants (under Arctic Region)

Acclimatization

Phenology

The relation of a plant to other plants, and to animals, may be considered under two aspects:

(a) There is often a close sympathetic relation between individual plants, and between an individual plant and animals. See:

Symbiosis

Endophyte

Epiphyte

Parasite, Plant

Obligate Plants

Facultative Plant

Entomophilous Plant

Myrmecophytes

Phycomycetes

(b) There is also a general relation due to soil, climate, struggle for existence, etc., between large numbers of individuals growing together and constituting what are known as plant societies. See:

Distribution of Plants

Form

Formation

Forest

Jungle

Thicket

Grasslands

Savannas

Steppe

Prairie

Llanos

Pampas

Meadow

Tundra

Swamp

Mangrove Swamp

Cypress Swamps

The nature of plant societies is also largely affected by the vegetative duration of its members. See:

Duration

Annuals

Biennials

Perennials

Æstival

Vernal Grass

Deciduous Plants

Evergreen

Geophyte

## D. Systematic Botany

This branch of the science of Botany comprises the classification of plants, the description of every known species

and of the larger divisions—genera, families, orders, classes, etc.—into which all species are grouped. Sys-

tematic Botany also includes the study of the relationships between the various groups and species of plants, and of their geographical distribution. It is obviously impossible here to refer to all the articles on even the more important genera; but, as the representative genera of each order are referred to in the article on the order, it is sufficient to give only the latter and the higher groups. For a general article on systematic botany, see TAXONOMY.

The whole vegetable kingdom is generally divided into four sub-kingdoms. See:

Thallophytes  
Bryophytes  
Pteridophytes  
Spermatophytes

I. The Thallophytes are divided into two parallel series. See:

Algæ  
Fungi

1. The Algæ are generally grouped into four classes. See:

Cyanophyceæ  
Chlorophyceæ  
Phæophyceæ  
Rhodophyceæ

2. For the main divisions of the Fungi, see:

Myxomycetes  
Schizomycetes .  
Ustilaginales  
Phycomycetes  
Ascomycetes  
Uredinales  
Basidiomycetes  
Lichens

II. The Bryophytes are grouped in two main divisions. See:

Hepaticæ

Musci

III. The living Pteridophytes fall into three main groups, the last two of which are generally called "the higher fern." See:

Fern  
Equisetum  
Lycopodiales

IV. The Spermatophytes, or seed-plants, form the bulk of the vegetation which covers the earth. They are divided into two classes. See:

Gymnosperms  
Angiosperms

1. The living Gymnosperms are grouped into four orders. See:

Coniferæ  
Cycadaceæ  
Gnetaceæ  
Ginkgo

2. The Angiosperms consist of numerous orders, which fall into two natural sub-classes. See:

Monocotyledons  
Dicotyledons

(a) The principal orders of Monocotyledons are described under:

Pandanaceæ  
Typha  
Gramineæ  
Cyperaceæ  
Palm  
Arum  
Bromeliaceæ  
Liliaceæ  
Smilaceæ  
Amaryllidaceæ  
Dioscoreaceæ  
Iridaceæ  
Musaceæ  
Zingiberaceæ  
Orchid

(b) The following are the most important orders of Dicotyledons, arranged in their order of relationship. Important genera of orders not separately described are inserted in their proper places.

*Archichlamydeæ*:

Mainly Apetalous. Chiefly  
Trees:

Piperaceæ  
Juglandaceæ  
Willow  
Poplar  
Birch  
Alder  
Cupuliferæ  
Moraceæ  
Urticaceæ  
Elm

Chiefly Weeds:

Polygonaceæ  
Chenopodiaceæ  
Amarantaceæ  
Mesembryaceæ  
Caryophyllaceæ

Mainly Polypetalous. Butter-  
cup Types:

Nymphæaceæ  
Magnolia  
Ranunculaceæ  
Berberidaceæ  
Lauraceæ

Poppy Types:

Papaveraceæ  
Fumariaceæ  
Cruciferae

Insectivorous Plants:

Sarracenia  
Sundew

Rose Types:

Saxifrage

Plane

Rosaceæ

Leguminosæ

Geranium Types:

Geranium  
Zygophyllaceæ  
Polygala  
Euphorbiaceæ

Maple Types:

Burseraceæ  
Anacardiaceæ  
Holly  
Maple  
Sapindaceæ  
Horse-Chestnut

Buckthorn Types:

Rhamnaceæ  
Vitaceæ

Mallow Types:

Tiliaceæ  
Malvaceæ

Violet Types:

Ternstroemiaceæ  
Violaceæ

Cactus Type:

Cactus

Myrtle Types:

Lythraceæ  
Myrtaceæ

Carrot Types:

Umbelliferæ  
Dogwood

*Sympetala*:

Heath Types:

Ericaceæ  
Huckleberry

Primrose Type:

Primulaceæ

Ebony Types:

Sapotaceæ  
Ebony

**Gentian Types:**

Loganiaceæ  
Gentianaceæ  
Apocynaceæ  
Asclepiadaceæ

**Phlox Types:**

Convolvulaceæ  
Polemoniaceæ  
Boraginaceæ  
Labiatæ

Solanaceæ  
Scrophulariaceæ  
Bignonia

**Madder Types:**

Rubiaceæ  
Caprifoliaceæ

**Bell-Flower Types:**

Cucurbitaceæ  
Campanulaceæ  
Compositæ

## *E. Economic Botany*

In its narrow sense, viewed as a strictly botanical science, economic botany is the study of those plants which are, or can be, used for some purpose in human economy. If we inquire further into the methods by which these plants are made available, we enter upon the fields of agriculture, pharmacy, mechanical arts, etc. By the above definition, economic botany includes a study of the common cultivated plants, such as the cereals, but, to avoid repetition, the cultivated plants are referred to only in the chapter on Agriculture, Horticulture, and Forestry. We shall therefore confine ourselves here to the articles describing the important wild, or not commonly cultivated, economic plants, classified according to their uses.

### **I. PLANTS USED FOR FOOD:**

Adansonia  
Areca  
Banana  
Brazilnuts  
Breadfruit Tree  
Butter-Tree  
Caryocar  
Caryota

Cashew Nut  
Cherimoyer  
Cocco  
Cocoonut  
Euryale  
Fungi, Edible  
Granadilla  
Grass-Tree  
Hog-Plum  
Iceland Moss  
Jubæa  
Mammec Apple  
Maple  
Mushroom  
Nelumbo  
Palmyra Palm  
Papaw  
Prickly Pear  
Reindeer Moss  
Sago  
Tamarind  
Ti  
Walnut  
Water-Chestnut

### **II. PLANTS USED IN PREPARING BEVERAGES:**

Beverage Plants  
Agave  
Assai

Ava  
Buriti Palm  
Carrageen  
Elder  
Maté  
Palmyra Palm  
Sloe  
Woodruff

III. PLANTS USED AS CONDIMENT OR  
IN CONFECTIONERY:

Flavoring Plants

Anise  
Caper  
Cardamom  
Cinnamon  
Coriander  
Ginger  
Jujube  
Juniper  
Laurel  
Licorice  
Marjoram  
Marsh-Mallow  
Mint  
Pepper  
Tonka Bean  
Vanilla

IV. PLANTS USED IN PERFUMERY:

Boswellia  
Lemon-Grass  
Lignum Rhodium  
Lily of the Valley  
Musk Plant  
Myrrh  
Patchouli  
Ylang Ylang

V. PLANTS YIELDING PIGMENTS:

Alkanet  
Aloe  
Brazil Wood  
Buckthorn  
Butea

Camwood  
Chay Root  
Fustic  
Henna  
Indigo  
Logwood  
Marking-Nut  
Walnut  
Weld  
Yam  
Zamia

VI. PLANTS YIELDING GUMS, WAX,  
OILS, ETC.:

Butter Tree  
Calophyllum  
Canarium  
Candleberry  
Candle-Nut  
Carnauba Palm  
Cashew Nut  
Dammar  
Elæococca  
Fir  
Grass-Tree  
Mastic  
Mesquite Tree  
Oil Palm  
Pine  
Tallow Tree

VII. PLANTS YIELDING FIBRE:

Agave  
Aloe  
Astrocaryum  
Attalea  
Bromelia  
Broom  
Butea  
Carnauba Palm  
Caryota  
Chamærops  
Corchorus  
Crotalaria

Eriodendron  
Giant Lily  
Gomuti  
Jute  
Kapok  
Ootrum  
Piassaba  
Yucca

VIII. PLANTS USED FOR TIMBER AND  
CABINET WOOD:

Ash  
Boxwood  
Butternut  
Calophyllum  
Cedar  
Cypress  
Dacrydium  
Dalbergia  
Elm  
Eucalyptus  
Fir  
Gmelina  
Greenheart  
Guaiaicum  
Hemlock Tree  
Hornbeam  
Ilex  
Kauri Pine  
Lignum Vitæ  
Lime Tree  
Mammee Apple  
Maple  
Oak  
Palmetto  
Palmyra Palm  
Pine  
Plane  
Podocarpus  
Spruce  
Tamarind  
Teak  
Tulip Tree  
Walnut

IX. PLANTS USED FOR ORNAMENTAL  
CABINET WOODS:

Alocs Wood  
Ebony  
Holly  
Letterwood  
Mahogany  
Palmyra Wood  
Rosewood  
Sandalwood  
Satinwood

X. PLANTS SUPPLYING VARIOUS PRIM-  
ITIVE NEEDS:

Bottle Gourd  
Bussu Palm  
Calabash Tree  
Daphne  
Nipa  
Palmyra Palm  
Papyrus  
Rattan

XI. PLANTS USED DIRECTLY IN IN-  
DUSTRIAL ARTS:

Carludovica Palmata  
Ice Plant  
Ivory, Vegetable  
Myrobalan  
Oak  
Quebracho  
Rattan

XII. MEDICINAL PLANTS:

Aconite  
Acorns  
Adansonia  
Agrimony  
Akee  
Allamanda  
Aloe  
Alum Root  
Angelica  
Angostura Bark  
Aristolochia  
Arnica

Asarabacca  
 Belladonna  
 Bittersweet  
 Broom  
 Butterfly-Weed  
 Cajeput  
 Calabar Bean  
 Carrageen  
 Cascarilla  
 Cassia  
 Centaury  
 Choke-Cherry  
 Cinchona  
 Cissampelos  
 Coca  
 Croton  
 Cubebs  
 Dill  
 Dock  
 Dogbane  
 Elder  
 Erigeron  
 Ergot  
 Eucalyptus  
 Feverwort  
 Gentian  
 Geum  
 Guaiacum  
 Horehound  
 Houseleek  
 Ipecacuanha  
 Jalap  
 Licorice  
 Mint  
 Myrrh  
 Poppy  
 Strychnos  
 Witch-Hazel  
 Zanthoxylum

### XIII. POISONOUS PLANTS:

Poisonous Plants  
 Abrus  
 Amanita

Andromeda  
 Belladonna  
 Bittersweet  
 Bitterwood  
 Calabar Bean  
 Cherry-Laurel  
 Coccus Indicus  
 Colchicum  
 Fungi, Edible and Poisonous  
 Hemlock  
 Henbane  
 Kalmia  
 Laburnum  
 Manchineel  
 Nightshade  
 Poison Oak  
 Stramonium  
 Sumach  
 Tanghin  
 Upas

### XIV. BIOGRAPHIES OF EMINENT BOTANISTS:

Adanson, M.  
 Barton, W. P. C.  
 Bauhin, J.  
 Bentham, G.  
 Bigelow, J.  
 Bonnier, G.  
 Boussingault, J. B. J. D.  
 Braun, A.  
 Brongniart, A. T.  
 Brown, R.  
 Brunfels, O.  
 Chapman, A. W.  
 Cohn, F. J.  
 Darlington, W.  
 De Candolle, A. L. P. P.  
 Desfontaines, R. L.  
 Eichler, A. W.  
 Engler, H. G. A.  
 Endlicher, S. L.  
 Gray, Asa  
 Grew, N.

Hellriegel, H.  
Hooker, Sir J. D.  
Hooker, Sir W. J.  
Jackson, B. D.  
Jussieu  
Ledebour, K. F. de  
Lenné, P. J.  
Lindley, J.  
Link, H. F.  
Linnæus, Carolus  
Michaux, A.  
Mohl, H. von  
Morong, Thomas  
Muhlenberg, G. H. E.  
Nees von Esenbeck, C. G.  
Nuttall, T.

Persoon, C. H.  
Pfeffer, W.  
Plumier, Charles  
Rafinesque, C. S.  
Sachs, J. von  
Saussure, N. T. de  
Schleiden, M. J.  
Schultze, M. S.  
Schweinitz, L. D. von  
Sullivant, W. S.  
Thunberg, K. P.  
Thurber, George  
Torrey, J.  
Tournefort, J. P. de  
Unger, F.  
Watson, S.



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## Chapter 26. Agriculture, etc.

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**T**HE systematic and artificial cultivation of plants for the purpose of supplying human necessities or luxuries constitutes the arts of Agriculture, Horticulture, and Forestry, or the cultivation of the field, the garden, and the forest. The distinctions between these three arts, however, are not so definite as one might suppose, and the apportionment among them of the articles dealing with plant culture will be more or less arbitrary. Thus Forestry and Horticulture meet in the arts of Arboriculture and Landscape Gardening. The products of Horticulture are, as a rule, luxuries rather than necessities; but the raising of vegetables for the table, although they are almost necessary articles of food, is generally treated under Horticulture rather than under Agriculture. The latter term is best confined to the cultivation on a large scale of products used extensively in human economy, and this distinction will be the basis for the following divisions of the whole subject.

### A. Agriculture

Agriculture, as its name implies, is the cultivation of the field, mainly for the purpose of providing a regular supply of organic food, both plant and animal. This indicates the two main divisions of farming, namely, the raising of food plants and the raising of animals. The former is, perhaps, the more complex process, requiring a more elaborate equipment of tools and machinery. It involves the selection and preparation of the soil, the sowing of the seed, the care of the growing crop, the prevention and cure of crop diseases, and the harvesting, manipulation, and disposition of the crop when ripe. The raising of animals involves their selection and breeding, the feeding and care of the animals, attention to the numerous diseases to which they are subject, and the manipulation and disposition of animal products, including the art of dairying. In connection with both branches of agriculture, there is the general management of the farm and its equipment. For a history of

the development of agriculture in the various countries, see the article, AGRICULTURE.

I. For the general articles on the farm and its equipment, see:

- Farm Buildings
- Implements, Agricultural
- Farm Management
- Dry Farming

II. The preparation of the soil requires, first, the selection of a soil suited for the crop, and often its artificial fertilization; and, second, its tillage and irrigation.

For the selection of soil, see:

- Soil
- Humus
- Alkali Soils
- Chernozem
- Gumbo Soil
- Fallow
- Waste Lands
- Rotation of Crops

For fertilization and fertilizers, see:

- Chemistry, Agricultural

**Fertilizers****Manures and Manuring****Green Manuring****Nitrification****Sewage Farming****Soil Amendments****Fish Manures****Bone Fertilizers****Guano****Marl****Compost****Gypsum****Poudrette****Lupine****Superphosphate****Thomas Slag**

The processes of tillage are described under :

**Tillage****Cultivator****Plow, Plowing**

For the irrigation and drainage of the soil, see :

**Irrigation****Drainage****Ditch****Mulch****Warping****Lysimeter**

When the soil has been prepared and tilled, the seed is sown. See :

**Seed Testing****Broadcasting****Drill****Harrow**

When the crop is ripe, it is harvested and prepared for the market. See :

**Harvest and Harvesting****Reapers, Reaping****Threshing****Hummeler****Fan, or Fanner**

III. The principal crops which are the subjects of agriculture are, of course, the food plants, and of these the most important are the cereals. Other plants, however, aside from those which are the subjects of horticulture, are also regularly cultivated, such as forage plants (see under Stock-Raising below), and plants used for fibre and various other purposes.

For the principal cereals, see :

**Cereals****Barley****Buckwheat****Maize****Millet****Oat****Rice****Rye****Wheat**

Other food crops are :

**Artichoke****Artichoke, Jerusalem****Bean****Beet****Cassava****Cowpea****Dolichos****Lentil****Pea****Potato****Pumpkin****Sago****Sorghum****Soy Bean****Sugar Beet****Sugar-Cane****Sweet Potato**

(For vegetables and fruits, see under section on Horticulture.)

Plants cultivated for fibre are :

**Bœhmeria****Cotton**

**Flax**

**Hemp**

**Hemp, Bowstring**

**Hemp, Manila**

**Hemp, Sisal**

**Hemp, Sunn**

**Henequen**

**Ramie**

Tobacco is also an important agricultural crop. See article **TOBACCO**.

IV. The care of the growing crop is of sufficient importance to have separate treatment, and the study and treatment of plant diseases is a science by itself. The principal cause of plant diseases are bacteria and fungi, and almost every kind of crop has its specific insect pests. These are all described in separate articles following the articles on the crops, under such titles as **COTTON INSECTS**, **RICE INSECTS**, etc., and, therefore, need not be enumerated here. The general articles on plant diseases and their treatment, and on diseases common to several crops are:

**Diseases of Plants**

**Fungicides**

**Insecticides**

**Insect Powder**

**Mildew**

**Blight**

**Botrytis**

**Canker**

**Chlorosis**

**Damping Off**

**Dry Rot**

**Ergot**

**Gummosis**

**Rust**

**Smuts**

The special diseases which affect particular crops are treated in the ar-

ticles on the separate crops, but a few are described in separate articles. See:

**Bunt**

**Cornstalk Disease**

**Crown-Gall**

**Ear Cockles**

**Clubroot**

**Oidium**

Some of the common weeds with which the farmer and gardener have to contend are described in the articles:

**Weed**

**Burdock**

**Chickweed**

**Chufa**

**Cockle**

**Chenopodium**

**Dodder**

**Orache**

**Pigweed**

**Tare**

V. The raising of live-stock is the second great department of agriculture, and involves the selection of the animals, their breeding and general care, a supply of the proper feed stuffs; attention to diseases, which constitutes the practice of veterinary medicine; and the preparation of the animal products for the market.

The most important animals raised as live-stock are described in the articles:

**Horse**

**Cattle**

**Mule**

**Sheep**

**Goat**

**Hog**

**Poultry**

**Fowl**

**Duck**

**Goose**

Turkey

Pigeon

Bee

For the breeding and general care of the animals, see:

Breeds and Breeding

Incubator

Horseshoeing

Hoof

Dehorning

Feeding Farm Animals

Soiling, Soiling Crops

Bee-Keeping

Feeding stuffs may be divided into two general classes, natural or growing forage plants and the more or less artificially prepared feeds. The forage plants may again be divided into grasses and those that are not grasses, the latter being largely leguminous plants. See:

Feeding Stuffs

Pasture

Meadow

For forage grasses, see:

Grasses

Agropyron

Andropogon

Bermuda Grass

Blue Grass

Brome Grass

Buffalo-Grass

Canary-Grass

Crab-Grass

Gama Grass

Manna-Grass

Meadow Grass

Millet

Oat Grass

Orchard Grass .

Redtop Grass

Rye-Grass

Sorghum

Teosinte

Timothy Grass

The principal forage plants other than grasses are:

Alfalfa

Burnet

Chufa

Clover

Cowpea

Fescue

Lupine

Mangel-Wurzel

Medicago

Medick

Melilot

Rape

Sainfoin

Serradella

Soy Bean

Sulla

Trefoil

Vetch

For the most important prepared feeds, see:

Brewers' Grains

Gluten Meal

Cottonseed Meal

Hay

Linseed Meal

Malt Sprouts

Silage

Farm animals are subject to numerous serious diseases, and the investigation and treatment of these constitute the profession of veterinary medicine. A convenient subdivision of animal diseases is according to the kinds of animals which they affect, since, with a few exceptions, each disease is either peculiar to, or chiefly prevalent in, a particular species. Several of these given under cattle diseases, however,

may also affect horses or sheep, and vice versa.

(a) The general articles on the subject and those dealing with diseases common to several kinds of live-stock are:

- Veterinary Medicine
- Diseases of Animals
- Abortion
- Anthrax
- Colic in Animals
- Ring Worm
- Mange
- Tuberculosis (in animals)

(b) For diseases primarily affecting the horse, see:

- Azoturia
- Bighead
- Canker
- Curb
- Fistula
- Founder
- Glanders
- Heaves
- Hoof
- Influenza in Animals
- Meningitis
- Navicular Disease
- Roaring
- Strangles
- Stringhalt
- Spavin
- Thrush

(c) For diseases of cattle, see:

- Actinomycosis
- Blackleg
- Cattle Plague
- Fardel-bound
- Foot-and-Mouth Disease
- Joint-Ill
- Malignant Catarrh
- Mammitis
- Milk Fever

- Red Water
- Texas Fever

(d) For diseases of sheep, see:

- Agalactia
- Bloat
- Braxy
- Fardel-bound
- Gid
- Icterohæmaturia
- Liver-Rot
- Lung-Worms
- Nodular Disease

(e) For a disease of hogs, see:

- Hog Cholera

(f) For diseases of poultry and bees, see:

- Blackhead
- Gapes
- Roup
- Diarrhœa, White, of Chickens
- Foul Brood

VI. In the preparation of animal products for the market, one of the most elaborate, as well as important, departments is that of **Dairying**. This industry involves the supply of milk and cream, and the manufacture of butter and cheese. For a general article on the subject and articles on the processes of manufacture, and the machinery and equipment of the dairy, see:

- Dairying
- Milking Machine
- Aëerator
- Creamery
- Separator
- Butter-Making
- Churn
- Butter-Worker
- Butter-Color
- Cheese-Making

**Cheese Factory**  
**Rennet**

For the principal dairy products,  
see:

**Milk**  
**Skim Milk**  
**Casein**  
**Cream**  
**Butter**  
**Cheese**  
**Buttermilk**  
**Milk Sugar (under Sugars)**  
**Ghee**  
**Kephir**  
**Koumiss**  
**Whey**

VII. Other more or less direct products of agriculture and stock raising, and the methods of their disposal, are described under:

**Market and Marketing**  
**Flour**  
**Farina**  
**Semolina**  
**Food**  
**Bread**  
**Sugar**  
**Honey**  
**Glucose**  
**Meat**  
**Pork**  
**Leather**  
**Wool**

See also **POULTRY** and **EGG** and the articles there referred to.

VIII. Since the patriarchal stage, Agriculture has been regarded as the most important of human industries, and is the one which has especially received direct and official attention from the governments of civilized nations. There are also at present numerous educational institutions, and private or semi-public associations for the advancement of the industry. See:

**Agriculture, U. S. Department of**  
**Agricultural Experiment Station**  
**Agricultural Education**  
**Farmers' Institute**  
**Agricultural Association**  
**Grange**

IX. For biographies of eminent agriculturists, see:

**Atwater, W. O.**  
**Brewer, W. H.**  
**Goodell, H. H.**  
**Harris, J.**  
**Hellriegel, H.**  
**Hilgard, E. W.**  
**Holdefleiss, F. W.**  
**Johnson, S. W.**  
**Judd, O.**  
**Lawes, J. B.**  
**Maereker, M.**  
**Morris, Daniel**  
**Ruffin, F.**  
**Thaer, A. D.**  
**True, A. C.**  
**Wallace, R.**  
**Young, A.**

## ***B. Horticulture and Forestry***

Horticulture is the art of producing plants which are valued for their agreeable properties rather than as necessities for human comfort. The horticultural methods of breeding,

propagating, and cultivating plants differ essentially from the agricultural method in that great attention is paid to the individual plant, while in agriculture attention is given to the crop

as a whole, in which the individual is lost. The subjects and products of horticulture are flowers, ornamental shrubs and trees, fruit trees, plants used as condiments, vegetables for the table, when considered merely as accessories to the more substantial articles of food, and all other plants treated by horticultural methods.

Horticulture also concerns itself with the laying out of gardens, and in this field of its activity it merges into landscape gardening and forestry. The latter, however, is a purely economic art and is not a branch of horticulture. It is included in this section because it is not yet a highly complex art and is, therefore, treated in a few general articles. For the general articles on Horticulture and Forestry, see:

- Horticulture
- Floriculture
- Landscape Gardening
- Arboriculture
- Forestry
- Afforestation

I. The buildings and equipments used by the horticulturist are described in the articles:

- Greenhouse
- Hothouse
- Conservatory
- Frame
- Espalier
- Hoe

One of the principal aims of horticulture is to develop particularly desirable varieties of plants and to maintain them true to the stock. For this purpose, special methods of breeding and propagation are necessary. See:

- Plant-Breeding

- Nursery
- Budding
- Cutting
- Grafting
- Layering
- Caprification

Special methods are also necessary in raising the young plants to maturity and securing the desired qualities in the matured product. See:

- Forcing
- Bottom Heat
- Electro-culture of Plants
- Pruning
- Cordon
- Blanching

For the most important plants cultivated in greenhouses, see:

- Greenhouse Plants
- Achimenes
- Azalea
- Banksia
- Carnation
- Chrysanthemum
- Fuchsia
- Gardenia
- Gladiolus
- Hyacinth
- Lily, Lily of the Valley
- Mignonette
- Oleander
- Passion-Flower
- Pelargonium

II. The principal articles on gardens, ornamental shrubs, and garden plants are:

- Lawn
- Hedge
- Ampelopsis
- Azalea
- Canna
- Centaurea
- Chrysanthemum

Convolvulus

Cosmos

Cotoneaster

Cowslip

Dahlia

Eschscholtzia

Heliotrope

Hibiscus

Hollyhock

Hyacinth

Hydrangea

Ivy

Jasmine

Jonquil

Laburnum

Larkspur

Laurustinus

Lavender

Libocedrus

Lilac

Lily

Lily of the Valley

Mignonette

Narcissus

Peony

Petunia

Phlox

Pink

Polyanthus

Poppy

Rose

Star of Bethlehem

Sunflower

Sweet Pea

Thrift

Tropæolum

Trumpet Flower

Tuberose

Tulip

Wallflower

Wistaria

Fruit, Cultivated

Orchard

Apple

Apricot

Banana

Blackberry

Butternut

Calville

Cherimoyer

Chestnut

Cranberry

Currant

Custard-Apple

Date

Dewberry

Earthnut

Fig

Gooseberry

Grape

Hazelnut

Huckleberry

Kumquat

Lemon

Lime

Litchi

Loquat

Mango

Melon

Mulberry

Muskmelon

Olive

Orange

Peach

Peanut

Pear

Persimmon

Pineapple

Plum

Pomegranate

Quince

Raspberry

Strawberry

Walnut

Watermelon

III. For the principal articles on  
fruit trees and fruit culture, see.



For table vegetables, see:

Vegetables  
Herbs, Culinary  
Salad Plants  
Asparagus  
Brussels Sprouts  
Cabbage  
Carrot  
Cauliflower  
Celery  
Corn-Salad  
Cress  
Cucumber  
Egg Plant  
Endive  
Garlic  
Kale  
Kohl-rabi  
Leek  
Lettuce  
Mushroom  
Onion  
Parsley  
Parsnip  
Radish  
Rhubarb  
Salsify  
Spinach  
Squash  
Tomato  
Truffle  
Turnip

V. For the principal plants cultivated for their flavoring qualities, see:

Flavoring Plants  
Allspice  
Almond  
Capsicum  
Caraway  
Chicory  
Chive  
Cinnamon  
Citron

Cloves  
Fennel  
Hop  
Horseradish  
Mace  
Mustard  
Nutmeg  
Pepper  
Pistacia  
Thyme  
Vanilla

VI. The section on horticulture should also include reference to the articles on the well known beverage plants, and on some of the more direct products of horticulture. See:

Coffee  
Tea  
Cacao  
Wine  
Cider  
Prune  
Raisins

VII. For biographies of eminent horticulturists and foresters, see:

Bailey, L. H.  
Burbank, L.  
Downing, A. J.  
Downing, C.  
Duhamel du Monceau  
Henderson, P.  
Hess, R.  
Heyer, G.  
Heyer, K. J.  
Hovey, C. M.  
Kenrick, W.  
Koristka, K. von  
Landreth, D.  
Lodeman, E.  
Longworth, N.  
Loudon, J. C.  
Lyon, T. T.  
Manning, R.

See also **HORTICULTURAL SOCIETIES.**

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## Chapter 27. Zoology

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**E**VERY topic of importance in Natural History, especially as represented in America, is contained in the pages of the *New International Encyclopædia*, which thus may justly be called a complete text-book of zoölogy. The outline of our knowledge of animal life thus furnished is supplemented, in respect to each part of it, by references to special books, museum collections, and other sources of knowledge where the student may find the minute details and investigations interesting and necessary to the specialist, but superfluous to a general reader. The material contained in the Encyclopædia is thus equally useful to the deep and to the superficial inquirer; for the specialist in one department of science needs to have at hand general information, at least, as to other departments.

Zoölogy has two aspects: (a) that of its observed facts; and (b) that of the principles involved: phenomena and deductions; condition and theory. The foremost or basic part is a knowledge of the facts of the animal world, namely: Form and Structure; Reproduction, Embryology and Growth; Habit; Instinct; Distribution, past and present; Relationship, of animals to one another, and to their environment. From these have been deduced the facts of the Classification and Evolution of forms.

### STRUCTURE.

The reader who seeks to take the topics dealing with Form and Structure in order may read the following articles:

Biology  
Morphology  
Animal  
Protoplasm  
Cell  
Amœba  
Embryology  
Anatomy  
Bone  
Skeleton; and the more particular accounts of its component parts, as SKULL, HAND, SHOULDER-JOINT, etc.  
Muscular System  
Circulatory System  
Alimentary System  
Excretory System  
Respiratory System  
Nervous System and Brain

Cephalization  
Metamerism  
Integument  
Horn  
Hoof  
Nail  
Teeth  
Hair  
Feather  
Pterylosis  
Scales  
Pigment  
Metachrosis  
Chromatophore  
Melanism  
Touch  
Taste  
Smell  
Eye  
Ear  
The structure of various animals, as characteristic of groups, is given in such general articles as:  
Amblypoda

Ammonites  
 Amphibia  
 Annulata  
 Arachnida  
 Archæopteryx  
 Bat  
 Beetle  
 Bird  
 Bovidæ  
 Butterflies and Moths  
 Brachiopoda  
 Camelidæ  
 Canidæ  
 Carnivora  
 Cephalopoda  
 Cestoda  
 Chordata  
 Cœlenterata  
 Coral  
 Crinoidea  
 Crustacea  
 Deer  
 Dinosauria  
 Dipnoi  
 Echinodermata  
 Elasmobranchii  
 Electric Fish  
 Felidæ  
 Fish  
 Fly  
 Fringillidæ  
 Frog  
 Ganoidei  
 Gastropoda  
 Holothurian  
 Horse, Evolution of the (under  
     Horse, Fossil)  
 Hydrozoa  
 Hymenoptera  
 Infusoria  
 Insect  
 Mammalia  
 Marsupialia  
 Medusa

Mollusca  
 Ophiuroidea  
 Prototheria  
 Protozoa  
 Pterodactyl  
 Pteropoda  
 Reptile  
 Rodentia  
 Sirenia  
 Snake  
 Turtle  
 Ungulata  
 Vertebrata

For the most part, the articles referred to contain, incidentally or cited in the appended Bibliography, the names of investigators identified with these particular subjects. In the great majority of cases the biography of each of these men is to be found in its alphabetical position in the *Encyclopædia*; and an earnest reader will turn to it, and so acquaint himself with the man by whose learning he is profiting.

#### REPRODUCTION AND GROWTH.

Animals continue to exist by reproducing their kind after various methods, and each individual passes through a more or less complicated series of changes from its beginning to its maturity, collectively known as its life-history, or autogeny. An orderly study of this essential phase of animal life may be conducted by reading the articles mentioned below, with the lesser ones indicated by cross-references:

Reproduction  
 Spontaneous Generation  
 Egg  
 Spermatozoön  
 Gemmule  
 Sex  
 Embryology

Fœtus  
 Epigenesis  
 Mitosis  
 Parthenogenesis  
 Alternation of Generations  
 Biogenesis  
 Cross-fertilization  
 Metamorphosis  
 Larva  
 Pupa  
 Metabolism  
 Growth  
 Regeneration  
 Heredity  
 Pangenesis  
 Prepotency  
 Telegony  
 Mendel's Law  
 Breeds and Breeding  
 Hybridity  
 Nidification

#### HABITS.

The habits of animals constitute the principal feature of what may be called Descriptive Zoology—that is, accounts of a species or a group of species placed under the vernacular name. This policy has been adopted, rather than that of putting descriptions under technical names, for greater convenience of reference, as well as to avoid that attitude of pedantry which made the earlier encyclopædias often ridiculous. The majority of readers would turn more naturally to HORSE than to “Equidæ” or to BLACKSNAKE than to “Zamenis.” The technical characteristics of many of the larger groups, lacking any English appellation, are given under their term in classification, as PROTOZOA, BOVIDÆ, and the like, or sometimes under the name of the special science dealing

with them, as ICHTHYOLOGY, ORNITHOLOGY. Habits of animals, then, may be learned from the descriptive articles generally, the principal of which are given below:

Agate Shell  
 Agouti  
 Albatross  
 Alewife  
 Alligator  
 Anaconda  
 Ani  
 Ant  
 Antelope  
 Ant-lion  
 Aoudad  
 Apteryx  
 Armadillo  
 Ass  
 Auk  
 Aurochs  
 Axolotl  
 Aye-aye  
 Baboon  
 Badger  
 Bandicoot  
 Bank swallow  
 Barn-owl  
 Barn-swallow  
 Bass  
 Bat  
 Bear  
 Beaver  
 Bedbug  
 Bee  
 Bighorn  
 Bird of Paradise  
 Bison  
 Bittern  
 Blackbird  
 Blacksnake  
 Bluebird  
 Bluefish  
 Boa

Bobolink	Crocodile
Bollworm	Crow
Bookworm	Cuckoo
Bot	Curlew
Bower-bird	Death Adder
Brant	Deathwatch
Buffalo-bird	Deer
Bug	Devilfish
Bulbul	Dingo
Bumblebee	Dodo
Bunting	Dog
Bushmaster	Dove
Bustard	Dragon-fly
Butterfish	Duck
Butterflies	Duckbill
Buzzard	Dugong
Caddis-fly	Duiker
Camel	Eagle
Capercaillie	Earthworm
Capybara	Eel
Caribou	Eider
Carp	Elephant
Carpenter Bee	Electric Fish
Cat	Ermine
Cattle	Falcon
Cave Animals	Fer-de-lance
Cavy	Firefly
Chameleon	Fish-hawk
Chamois	Flamingo
Chinch-bug	Flea
Cicada	Flesh-fly
Civet	Fly
Clam	Fly-catcher
Clothes-moth	Flying Squirrel
Cockatoo	Fox
Cockroach	Frog
Cod	Gall-insects
Conch	Gannet
Condor	Garefowl
Copperhead	Gazelle
Cowbird	Gibbon
Coyote	Gipsy Moth
Crab	Giraffe
Cricket	Gnat

Goat  
Goldfinch  
Goose  
Gopher  
Gorilla  
Goshawk  
Grayling  
Grebe  
Grouse  
Guanaco  
Gull  
Halibut  
Hare  
Hawk  
Hedgehog  
Hermit Crab  
Heron  
Herring  
Hessian Fly  
Hippopotamus  
Hognose  
Hook-worm  
Hornbill  
Horse  
Hound  
House-fly  
Humming-bird  
Hyena  
Ibex  
Ibis  
Iguana  
Jackal  
Jackdaw  
Jaguar  
Jay  
Jelly-fish  
Jungle Fowl  
Kangaroo  
Katydid  
King-bird  
Kingfish  
Kingfisher  
Kraken  
Lace-bug

Lamprey  
Land Tortoise  
Leech  
Lemming  
Lemur  
Leopard  
Lion  
Lizard  
Llama  
Lobster  
Lory  
Louse  
Lungfish  
Mackerel  
Mallard  
Mammalia  
Mammoth  
Manatee  
Man-eater Shark  
Marsh Hawk  
Marten  
Maskinonge  
Mastodon  
Menhaden  
Mole  
Mollusk  
Monkey  
Moose  
Mosquito  
Moth  
Mouse  
Mule Deer  
Mungoos  
Musk Ox  
Muskrat  
Narwhal  
Nest  
Nightingale  
Nightjar  
Nurse-frog  
Nutria  
Opossum  
Orang-utan  
Oriole

Ostrich	Sardine
Otter	Sawfish
Owl	Scale Insect
Oyster	Scorpion
Palolo Worm	Sea-anemone
Parrakeet	Sea-bass
Parrot	Sea-horse
Partridge	Seal
Peacock	Sea-otter
Pheasant	Sea-urchin
Pigeon	Shark
Pipa	Sheep
Pipefish	Sheepshead
Plant-bug	Shore-birds
Plover	Shrew
Polecat	Shrike
Pompano	Shrimp
Porcupine	Silkworm
Porpoise	Skunk
Potato Insects	Skylark
Prairie Dog	Sloth
Ptarmigan	Smelt
Puma	Snail
Python	Snake
Quagga	Snipe
Quail	Spaniel
Quinnat Salmon	Sparrow
Rabbit	Spider
Raccoon	Sponge
Rail	Sporozoa
Rat	Squid
Rattlesnake	Squirrel
Raven	Starfish
Ray	Stickleback
Rhinoceros	Stork
Road-runner	Sturgeon
Robin	Sunfish
Rocky Mountain White Goat	Swallow
Roe Deer	Swan
Rook	Swift
Sable	Swine
Salamander	Tailor-bird
Salmon	Tanager
Sandpiper	Tapeworm

Tapir  
 Tarantula  
 Tautog  
 Termite  
 Terrapin  
 Terrier  
 Thread-worms  
 Thrush  
 Tick  
 Tiger  
 Tiger-hunting  
 Tilefish  
 Titmouse  
 Toad  
 Toucan  
 Tree-frog  
 Trogon  
 Trout  
 Tsetse-fly  
 Turbot  
 Turkey  
 Turtle  
 Umbrella-bird  
 Vampire  
 Veery  
 Viper  
 Vireo  
 Viscacha  
 Vulture  
 Walrus  
 Wapiti  
 Warbler  
 Wasp  
 Watersnake  
 Water-spider  
 Water-thrush  
 Wax-insect  
 Weakfish  
 Weasel  
 Weaver-bird  
 Weevil  
 Whale  
 Whippoorwill  
 Wildcat

Wolf  
 Woodpecker  
 Wood-rat  
 Worm  
 Wren  
 Yak  
 Zebra

#### MIND IN ANIMALS.

The intelligence and mental processes of animals are subjects to which much attention has been paid recently, and facts bearing upon them are eagerly sought. Some of the conclusions of students will be found in the following:

Ant  
 Nervous System, Evolution of the  
 Habit  
 Instinct  
 Social Insects (under Insect)  
 Orientation

#### DISTRIBUTION OF ANIMALS.

Everyone is aware that different parts of the earth's surface have different faunas, and that this condition apparently remains permanent, except when, by means of civilization or commerce, certain animals are enabled to spread beyond their natural habitat, and even become cosmopolitan, as have rats, house-mice, the European house-sparrow, and a large number of plant-feeding insects. Normally one fauna does not enlarge or diminish at the expense of another, and, for the most part, species of animals, as of plants, are restricted to a comparatively small range and set of climatic conditions. The local faunas, both on the land and in the sea, have been examined, and their boundaries well ascertained. It has been found, however, that groups of related faunas



exist side by side, which may be composed into large divisions called "sub-regions," and these into a few still larger ones called "regions." The natural barriers which are set to the dispersion of animals, and the finding of the actual boundaries of the faunal districts, form the outlines of the highly interesting study of the geographical distribution of animal life, past and present. To acquaint himself with this science, the reader should peruse the following co-related articles:

- Distribution of Animals
- Fauna
- Ethiopian Region
- Paleotropical Region
- Holarctic Region
- Nearctic Region
- Oriental Region
- Palaearctic Region
- Deep-sea Exploration
- Pelagic Animals
- Plankton

See also the names of the various subregions, as NEW ZEALAND SUB-REGION, MALAGASY SUBREGION, etc.; the paragraphs on *Fauna* under the names of the various continents and countries, as AMERICA, AUSTRALIA, BRAZIL, and the like; and, for the distribution of animals in past ages, PALEONTOLOGY, EXTINCTION OF SPECIES and MIGRATION OF ANIMALS.

#### RELATIONSHIP.

The relationship of animals toward others, and to the environment of each individual, species, or group, forms a feature of far-reaching importance and of great interest in zoology, and the study of the facts involved has been set apart as a science under the name of BIONOMICS. Much relating to it

will be found in the descriptive articles cited under Habits and elsewhere, but special consideration is given under the succeeding heads:

- Bionomics
- Cave Animals
- Environment
- Estivation
- Flowers and Insects
- Hibernation
- Social Insects (under Insect)
- Natural Selection
- Orientation
- Parasite
- Symbiosis
- Tropism

The relations between man and the lower animals are mainly those of warfare or service. Animals are in the way of his operations or dangerous to him, and must be got rid of, or supply him with flesh, or hide, or fur, or some other desirable thing, which can be obtained, in most cases, only by killing them; or they attract him to the chase and to such sports as angling and shooting. Hence, many are sought only to be killed, and some species have been entirely exterminated. On the other hand, his agricultural operations have encouraged the spread and development of some, as various insects, rats, etc., in a remarkable way. A third class has been utilized by domestication and turned to his service and benefit. Some articles of special moment in the Encyclopædia dealing with this sporting and economic aspect of natural history are these:

- Acclimatization
- Angling
- Bee
- Buffalo

Domestic Animals (and the various kinds, as Camel, Cat, Dog, Horse, Sheep, Fowl, etc.)

Extinct Animals

Falconry

Fish as Food

Fish Culture

Fisheries

Fishing

Fur and the Fur Trade

Game Laws

Game Preserve

Insects, Propagation of Disease by

Introduced Species (especially of injurious insects, such as those described under Bollworm, Cutworm, Chinch-bug, Pear Insects, etc.)

Mosquito

Oyster

Pearl

Prairie Dog

Rabbit

Seal

Silkworm

Taxidermy

#### METHODS OF STUDY.

The methods of study in natural history are described to some extent in the articles:

Deep-sea Exploration

Laboratory

Microscope

Morphology

Nature-Study

Psychological Apparatus

Zoölogical Garden

Zoölogical Station

#### CLASSIFICATION OF ANIMALS.

Turning now from the methods and facts of observation and experiment to the philosophical deductions,—the principles and theories drawn from these

facts,—the reader will first need to attend to the subject of classification, which has been slowly developed through a long series of errors and limitations and gradually corrected in the brightening light of growing knowledge. The history of this search for the true, because natural, classification may be found in the articles ANATOMY, CLASSIFICATION OF ANIMALS, and ZOÖLOGY, with the names of the men who from time to time notably advanced taxonomy, and whose biographies may be read. No real success was achieved until the modern conviction was arrived at, that the key to the problem of classification was to be found in community of descent, and that any true classification must follow the perception of genetic relationship—descent from a common ancestor. This is the basis of modern classification, and what we have approaches perfection in just the degree that the phylogeny of each group is rightly apprehended. As a result of the constant increase of knowledge, the arrangement of this group and that is constantly being modified and presumably always improved. From time to time, these amendments are gathered up and critically combined into a general scheme. The latest such scheme of classification of the whole animal kingdom, which is authoritative and at the same time generally accessible, is that contained in Parker and Haskell's *Text-book of Zoölogy*, and this has been followed in respect to the general outline in this Encyclopædia, insuring uniformity. For further details, consult:

Classification of Animals

Phylogeny

**Variation****Type****Zoology**

For the classification of separate groups, see their titles, as CœLENTERATA, CRUSTACEA, MOLLUSCA, ECHINODERMATA, etc.

**ZOÖLOGY AND EVOLUTION.**

The philosophical part of zoology has been developed since man began to observe the ways of nature, and has produced a vast body of "laws," doctrine, and speculation, the history of which is sketched in such general articles as ANATOMY, ZOÖLOGY, EVOLUTION, etc., and the biographies of the great thinkers cited should be read in connection with their themes. Science has constantly tended to separate itself from metaphysics, and to use its hypothesis merely as a means for further investigation of phenomena. The outcome has been the formulation and general acceptance of a theory of universal development from the simple to the complex, from the homogeneous to the specialized; and Organic Evolution or the Doctrine of Descent is the application of the general principle to the history and phenomena of living things. A reader who wishes to acquire a knowledge of these views of nature may do so by reading in consecutive order the articles named below:

**Biology****Evolution****Ontogeny****Phylogeny****Natural Selection****Lamarckism****Growth****Heredity****Hybridity****Mendel's Law****Extinction of Species**

Guided by these articles and the cross-references to be found in them, he may pursue the subject under other fruitful titles, such as:

**Botany****Chromosomes****Cross-fertilization****Degeneration as a Factor in Evolution****Embryology****Environment****Flowers and Insects****Isolation****Kinetogenesis****Longevity****Mechanics of Development****Mimicry****Neo-Darwinism****Neo-Lamarckism****Otter Sheep****Pollination****Polymorphism****Protective Coloration****Recognition Marks****Regeneration****Reversion****Senescence****Sex****Sexual Selection****Use-Inheritance****Variation****Warning Coloration****Weismannism****BIOGRAPHY.**

Only a name or two has been quoted in the preceding analysis of the science of zoology. The investigators in the field have been numerous, and the following list should be regarded as selected rather than complete. See:

**Agassiz, L.**

- Audubon, J. J.  
Baer, K. E.  
Baird, S. F.  
Balfour, F. M.  
Barry, M.  
Bates, H. W.  
Beecher, C. E.  
Bennett, J. H.  
Bichat, M. F. X.  
Blumenbach, J. F.  
Bory de Saint Vincent, J. B.  
Burbank, L.  
Burmeister, H.  
Camper, P.  
Carus, K. G.  
Castelnau, F.  
Clark, H. J.  
Cope, E. D.  
Coste, J. V.  
Cuvier, G. L. C.  
Dana, J. D.  
Darwin, C.  
Davenport, C. B.  
Degeer, K.  
Dohrn, A.  
Du Bois-Reymond, E. H.  
Dujardin, F.  
Eimer, T.  
Eschscholtz, J. F.  
Fleming, J.  
Flourens, M. J. P.  
Forel, A.  
Galton, F.  
Gay, C.  
Gegenbaur, K.  
Geoffroy Saint-Hilaire, E.  
Gesner, K.  
Goode, G. B.  
Gould, A. A.  
Gould, J.  
Graaf, R. de  
Green, S.  
Haeckel, E.  
Haller, A.  
Harvey, W.  
Hertwig, O.  
Hertwig, R.  
Huber, F.  
Humboldt, A.  
Hunter, J.  
Huxley, T. H.  
Hyatt, A.  
Jordan, D. S.  
Kölliker, A.  
Lamarck, J. B.  
Lang, A.  
Lankester, E. R.  
Le Conte, L.  
Le Conte, J. E.  
Le Conte, J. L.  
Leeuwenhoek, A.  
Leidy, J.  
Lesueur, C. A.  
Leuckart, R.  
Levaillant, F.  
Leydig, F.  
Linnæus, C.  
Loeb, J.  
Lubbock, J.  
Lyonnet, P.  
Malpighi, M.  
Marsh, O. C.  
Mendel, G. J.  
Mivart, St. George  
Müller, J.  
Müller, J. F. T.  
Orbigny, A. D. d'  
Osborn, H. F.  
Owen, Richard  
Packard, A. S.  
Pallas, P. S.  
Perty, J. A. M.  
Ray, J.  
Réaumur, R. A. F.  
Reimarus, H. S.  
Romanes, G. J.  
Ross, A. M.  
Roux, W.

Schleiden, M. J.  
Schultze, M. S.  
Schwann, T.  
Sedgwick, W. T.  
Semper, K.  
Siebold, K. T. E.  
Spallanzani, L.  
Spencer, H.

Swammerdam, J.  
Tschudi, J. J.  
Vries, H. de  
Wagner, M.  
Wallace, A. R.  
Weismann, A.  
Wilson, A.  
Wyman, J.

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## 28. Manufactures and Engineering

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**T**HE development of manufacturing industries has resulted from more efficient economic organization, and from the perfection of technological processes involving the application of scientific discoveries and knowledge. Accordingly, the most profitable method of study is first to consider the development of manufactures in general from the economic standpoint, and especially of the Factory System, where concentration permits of manufacture in increased quantities at diminished expense. This will be found treated in the articles on **FACTORIES** and **MACHINERY**, **ECONOMIC EFFECTS OF**, in which is traced the growth of manufacturing in general. For specific industries, reference should be made to the separate articles, as the historical and statistical development of any given industry is best considered by itself, on account of the important relation that it bears to practical questions of material, processes, and the like. This brings us straightway to the leading question how things are made, which it is an important function of an encyclopædia to answer. In this is involved the gathering and preparation of the raw material, the manufacture, the finishing, and the distribution, or utilization, of the finished product. There are prepared below a number of lists of subjects, more or less cognate, dealing with manufacturing industries and their products, and, by carefully observing the cross-references, a complete idea of the more important processes may be gained.

### A. Manufacturing Processes

#### FOOD AND MANUFACTURE OF FOOD STUFFS, ETC.

An important field of manufacturing operations is that concerned with the preparation of food stuffs, both in the factory and on a less extensive scale in the home. **COOKERY**; **FOOD, PRESERVATION OF**; **SLAUGHTER HOUSES**; and **PACKING INDUSTRY** are titles that suggest the wide range of subjects that may be grouped under such a head. The following list indicates appropriate titles:

Meat  
Slaughter Houses  
Packing Industry  
Food, Preservation of  
Digester

Extract of Meat  
Ham  
Lard  
Tallow  
Pemican  
Jerked Beef  
Cookery  
Wheat  
Flour  
Baking  
Bread  
Biscuit  
Baking Powder  
Butter  
Cheese  
Guarana  
Macaroni  
Sugar  
Sardine

Gelatin  
 Confectionery  
 Chocolate  
 Cocoa Butter  
 Chewing Gum  
 Macaroon  
 Condiments  
 Pickles  
 Chutnee  
 Curry Powder  
 Olive Oil

#### FERMENTED AND DISTILLED LIQUORS.

The manufacture of BEER, WINE, and LIQUORS involves many interesting processes in chemical technology. A convenient beginning may be made by considering the history of fermented and distilled liquors, and the extent to which they are manufactured and consumed. Then, taking up the general properties of beer, wine, and distilled liquors, a classification of these beverages can be made, and the essential features of their production learned. Further details appropriate to the manufacture are discussed under BREWING, STILL, BOTTLING AND BOTTLING MACHINERY, while questions involving the chemistry of the subject are treated under FERMENTATION, DISTILLATION, and ALCOHOL. The physiological effects of alcohol are not only interesting, but instructive, and are properly considered in connection with the manufacture of alcoholic beverages. For a comprehensive study of the whole subject, the following articles should be consulted:

Liquors, Fermented and Distilled,  
 Statistics and History of  
 Alcohol  
 Alcoholometry  
 Hydrometer

Alcohol, Physiological and Poisonous Action of  
 Fermentation  
 Brewing  
 Beer  
 Wine  
 Currant Wine  
 Distilled Liquors, or Ardent Spirits  
 Distillation  
 Brandy  
 Apple Brandy  
 Rum  
 Whisky  
 Fusel Oil  
 Geneva  
 Gin  
 Liqueur  
 Absinthe  
 Benedictine  
 Chartreuse  
 Curaçoa  
 Kirsch  
 Kümmel  
 Maraschino  
 Ratafia  
 Noyau  
 Bishop  
 Cider  
 Berlin Spirit  
 Bottling and Bottling Machinery

#### FIBRES AND TEXTILES.

The subject of fibres and textiles is one of novel scope and, for its proper comprehension, requires first the consideration of the fibres themselves and how they are produced and prepared for manufacture. The chief vegetable fibres are;

Cotton  
 Flax  
 Hemp  
 Jute  
 Linen  
 Hemp, Manila

Ramie  
 Coir  
 Cotton, Artificial  
 Wood Pulp Yarns  
 Silk  
 Silk Worm  
 Floss Silk  
 Organzine  
 Wool  
 Wool and Worsted Manufactures  
 Sheep  
 Noils  
 Shoddy

It is next advisable to consider the processes by which the fibres are prepared for spinning and weaving. These processes are discussed in the following articles:

Cotton-Gin  
 Heckle  
 Carding  
 Spinning  
 Yarn

Textile manufacturing comprises industries of many diverse characters, which employ complicated machinery. As they have a certain amount of similarity, and bear some relation to each other, the processes of making the various fabrics may first be considered together. The first step is the designing of the fabric, in which the weaves, patterns, and designs are made on the Loom. This naturally involves the discussion of WEAVING, which should explain the fundamental weaves and the methods by which patterns are produced. Therefore, in this connection, the following articles should be consulted:

Textile Manufacturing  
 Textile Designing  
 Weaving  
 Loom

Heddle  
 Bobbin

Crocheting and knitting differ essentially from weaving and, whether performed by hand or machine, are the means of producing garments and other useful articles. The following titles indicate the articles to be consulted on these subjects:

Crochet  
 Knitting  
 Hosiery

Either the yarn or the finished fabric may be dyed, or the latter may be printed, in order to impart colored designs to it. In either case, complex and interesting processes are involved, which are described in the list below:

Dyeing  
 Coal-Tar Colors  
 Vegetable Colors  
 Indigo  
 Turkey Red  
 Textile Printing  
 Beetling  
 Calendering  
 Bleaching  
 Bleaching-Powder  
 Embroidery

The finished textile fabrics are almost infinite in their variety. It is possible to select the more important and the representatives of the leading classes and study them in detail. Such a list arranged alphabetically is as follows:

Art Square  
 Bandana  
 Barege  
 Batiste  
 Blanket  
 Bobbinet



Bolting-Cloth  
 Bombazine  
 Brocade  
 Brocatel  
 Brussels Lace  
 Buckram  
 Bunting  
 Cambric  
 Camel's Hair  
 Camlet  
 Canvas  
 Carpet  
 Cassimere  
 Chenille  
 Chintz  
 Corduroy  
 Crape  
 Cretonne  
 Crinoline  
 Damask  
 Diaper  
 Dimity  
 Dornick  
 Drugget  
 Duck  
 Felt  
 Flannel  
 Floor-Cloth  
 Fustian  
 Galloon  
 Gauze  
 Gingham  
 Grass Cloth  
 Gunny  
 Haircloth  
 Huckaback  
 Kersey  
 Lace  
 Linen  
 Matting  
 Mercerized Cotton  
 Mohair  
 Moire  
 Moleskin

Muslin  
 Nankeen Cloth  
 Nets  
 Oilcloth  
 Piña Cloth  
 Plush  
 Poplin  
 Rugs  
 Satin  
 Silk  
 Taffeta  
 Tapestry  
 Tarlatan  
 Tweed  
 Velvet

#### LEATHER AND LEATHER MANUFACTURES.

The various processes for the manufacture of LEATHER are described under that title, and the finished products, such as boots, shoes, saddlery, etc., in which independent industries participate, are appropriately grouped by themselves. For leather and leather goods, the following list is recommended:

Leather  
 Bark  
 Tanning (under Leather)  
 Buckskin  
 Glove  
 Buff Leather  
 Cordovan  
 Shagreen  
 Chamois  
 Leather Cloth  
 Saddlery  
 Boot  
 Shoes  
 Blacking

#### CARRIAGES AND OTHER VEHICLES.

From the primitive ox-cart to the

modern motor vehicle in its numerous forms for business and pleasure is a long step, and it includes the development of many vehicles that have wrought important economic and social changes, involving new and improved road construction. These are represented in the following list:

- Cart
- Chariot
- Carriage
- Coach
- Driving
- Coupé
- Hansom Cab
- Wagonette
- Buckboard
- Phaeton
- Ambulance
- Bicycle
- Automobile
- Motor Vehicle
- Motor Cycle
- Side Car

#### CERAMIC INDUSTRIES.

Clay affords the fundamental material for numerous products used in industry and also for works of art. From its geology to its decorative application many interesting processes are involved, and the reader will find the subject well covered in the *NEW INTERNATIONAL ENCYCLOPAEDIA*. It is recommended that at the outset the article *CLAY* be studied, followed by those on the accompanying list which discuss rather the industrial uses as somewhat distinct from the mere artistic, as contained in the next following section:

- Clay
- Kaolin
- Kiln

- Fire Brick
- Fire Clay
- Pipe Clay
- Pottery
- Tile
- Terra Cotta
- Fireproof Construction

#### PORCELAIN AND POTTERY.

There are few more interesting studies than that of porcelain and pottery, and, if the processes are traced from the production of the clay until the finished piece emerges from the kiln after the final firing, the reader will be well repaid. For this purpose the following articles are recommended:

- Pottery
- Porcelain
- Biscuit
- Kiln
- Annealing
- Ceramic
- Enamel
- Bow China
- Burmese Ware
- Vase
- Cracklin
- Stoneware (under Delft)
- Delft Ware
- Eggshell China
- Faience
- Jasper Ware
- Majolica
- Terra Cotta
- Tile
- Pyrometer

#### GLASS.

Few materials are more extensively employed in the arts than glass, and in scientific work and in decoration it also holds an important place. For the es-

sential features of its manufacture, the comprehensive and general article **GLASS** should be consulted, while the subordinate topics, as listed below, should be read in this connection:

Glass  
 Flint Glass  
 Crown Glass  
 Iridescent Glass  
 Water-Glass  
 Wire Glass (under Glass)  
 Bottle  
 Carboy  
 Prince Rupert's Drops  
 Bologna Vial  
 Lens  
 Mirror  
 Lorraine Glass  
 Stained Glass  
 Gems, Imitation

#### **HOROLOGY.**

The construction of various instruments for keeping time is a science of considerable antiquity, and its various departments may be studied with profit. A convenient arrangement of titles is given below:

Horology  
 Clock  
 Watch  
 Clepsydra  
 Dial  
 Hour-Glass  
 Balance  
 Escapement  
 Fusee  
 Pendulum  
 Isochronism  
 Chronoscope  
 Chronograph  
 Time, Standard  
 Time Signals

#### **PRINTING, TYPOGRAPHY, ENGRAVING, PAPER, ETC.**

The development of the art of printing has brought about many connected processes and industries. These are concerned with the impression on paper of letters or designs in one form or another, or the provision of the apparatus and machinery to do this, as well as the material to receive the impression. An arrangement of such subjects is as follows:

Printing  
 Case  
 Type Founding  
 Typesetting Machines  
 Electrotyping (under Electro-Chemistry, Industrial)  
 Bank Notes, Manufacture of  
 Engraving  
 Photo-Engraving  
 Three-Color Process  
 Lithography  
 Rotogravure  
 Ink  
 India Ink  
 Graphotype  
 Paper  
 Parchment  
 Parchment, Vegetable  
 Cardboard  
 Bristol Board  
 Cartridge-Paper  
 Calendering  
 Bookbinding  
 Envelope  
 Pen  
 Fountain Pen (under Pen)  
 Pencil  
 Typewriters  
 Copying Machines  
 Sealing-Wax  
 Ruling Machine

**MISCELLANEOUS INDUSTRIES AND PRODUCTS.**

Bead  
Bell  
Blacking  
Bristles  
Brush and Broom  
Button  
Candle  
Celluloid  
Coal-Tar  
Coke  
Comb  
Cooperage  
Cork  
Corset  
Cosmetics  
Doll  
Embossing  
Excelsior  
Fan  
Flowers, Artificial  
Gems, Imitation and Artificial  
Gilding  
Gimp  
Glove  
Glue  
Gold Lace  
Grease  
Gutta-Percha  
Ivory  
Ivory, Vegetable  
Japanning  
Jewelry  
Lac  
Lacquer-Work  
Lapidary Work  
Laundry Machinery  
Linoleum  
Lumber Industry  
Mangle  
Matches  
Needle  
Ormolu

Papier-Maché  
Pen  
Pencil  
Perfumery  
Petrolatum  
Pin  
Poppy-seed Oil  
Pyrotechny  
Rope  
Rubber  
Sawdust  
Sewing Machine  
Silkworm Gut  
Straw Manufactures  
Tableware, Silver-Plated  
Tobacco Pipe  
Vacuum Cleaners  
Varnish  
Voting Machine

**MINING AND METALLURGY.**

In addition to general articles on MINING and METALLURGY, there will be found, under the various metals, articles dealing not only with their occurrence and general properties, but also with their mining and metallurgy. Such articles are included in the following list :

Mining  
Metallurgy  
Iron and Steel  
Copper  
Gold  
Silver  
Nickel  
Zinc  
Platinum  
Lead  
Tin  
Antimony  
Manganese  
Mercury  
Aluminium

Cobalt  
Molybdenum  
Litanium  
Tungsten  
Uranium  
Vanadium

Looking, however, at special methods of mining and metallurgy, there are general articles which have reference to the more common metals and the methods of producing and refining them. These articles are as follows:

Mining  
Mines and Mining in Law  
Blasting  
Explosives  
Mine Accidents  
Assaying  
Metallurgy  
Metallography  
Calcining  
Crucible  
Ore Dressing  
Roasting  
Chloridizing  
Chlorination  
Refining of Metals  
Electro-Chemistry  
Electric Furnace

Although considerable material on metal working is given under the metals themselves, there are certain processes which can be described in special articles. These include the following:

Founding  
Forge, Forging  
Anvil  
Welding  
Tempering Steel  
Annealing  
Dies and Die-Sinking

Damaskeening  
Brazing  
Rolling Mill  
Grinding and Crushing Machinery  
Mint  
Draw-Plate  
Electro-Plating  
Metal-Working Machinery

For many purposes, alloys are more useful than simple metals. These are discussed under their own heads, as well as in a collective article, while other preparations of metal, as GALVANIZED IRON and STEEL WOOL are also treated. A list of such articles is as follows:

Alloy  
Alloys Magnetic  
Brass  
Bronze  
Babbitt Metal  
Fusible Metal  
Coinage  
Pinchbeck  
Solder  
Flux  
Galvanized Iron  
Steel Wool

The ornamental working of metals into small objects is also to be considered, and there are a number of articles which treat the subject from the artistic as well as the practical side. These titles include:

Jewelry  
Plate, Sheffield  
Tableware, Silver-Plated  
Gold-Beating  
Gold-Beater's Skin  
Repousée  
Enamel  
Embossing

## B. Construction

### BUILDING AND BUILDING MATERIALS.

The materials used in building embrace natural and artificial substances which are specially wrought for the purpose. Whether we start with the lumber from the forest or the stone of the quarry, we find that there are a number of processes which have to be gone through before the material is finally disposed of in its appointed place. Considering first the materials for building, together with their sources, the following list has been constructed:

- Building-Stone
- Quarry, Quarrying
- Stone Cutting and Dressing
- Stone, Artificial
- Clay
- Brick
- Mortar
- Kiln
- Cement
- Concrete
- Terra Cotta
- Tile
- Gypsum
- Lumber Industry
- Factor of Safety
- Strength of Materials

For a study of the process of BUILDING, the article under that title will furnish an adequate idea. The separate branches, however, require more extensive treatment, as the following topics will suggest:

- Building
- Carpentry
- Cabinet Work
- Foundation

- Masonry
- Brick Work
- Fireproof Construction
- Steel Skeleton Construction
- Half Timber
- Plaster, Lathing and Plastering
- Heating and Ventilation
- Plumbing
- Elevator
- Paper-Hangings
- Painting
- Illumination
- Gas, Illuminating and Fuel
- Electric Lighting

For certain forms of building, such as APARTMENT HOUSES and HOTELS, somewhat different equipment is required, and these are discussed under their own heads. For building operations in general, there are a number of minor topics that require a separate treatment. These may be included in the following list:

- Centring
- Chimney
- Door
- Window
- Framing
- Column
- Girder
- Beam
- Brace
- Roof
- Gutter
- Lightning, Protection from
- Lock
- Alarm
- Fire-Escape
- Calcimine
- Heating and Ventilation

## C. Engineering

The constantly broadening field of engineering endeavor has resulted in dividing the work, so that to-day an engineer adopts but a comparatively small field for his own activity. Under **ENGINEER AND ENGINEERING** will be found a description of the modern divisions of engineering work and the qualifications of the men that follow each branch. In civil engineering, first may be mentioned the surveyor.

### SURVEYOR.

Surveying involves the measurement of distances and areas and the delineation of the territory examined. It is carried on in different ways, depending on the extent and character of the country under survey. The following shows the general division of topics:

- Surveying
- Coast and Geodetic Survey
- Geological Survey
- Geodesy
- Triangulation
- Isostasy
- Deflection of the Plumb Line
- Hydrography
- Dredge
- Sound, Sounding
- Photographic Surveying
- Altimetry
- Hypsometry
- Leveling
- Offset
- Map
- Engineering Instruments
- Theodolite
- Plane-Table
- Stadia
- Telemeter
- Vernier

- Sextant
- Compass, Solar
- Planimeter
- Range-Finder
- Aneroid
- Heliograph
- Odometer

### RAILWAYS.

After a general and comprehensive review of the subject of **RAILWAYS** in the article of that title, particular parts require somewhat fuller treatment, involving, as they do, engineering and other features of a unique character. For this purpose, the following list is supplied:

- Railways
- Street Railway
- Urban Railways
- Electric Railways
- Ship Railway
- Locomotive
- Compressed-Air Locomotive
- Tunnel
- Bridge
- Cantilever
- Viaduct
- Culvert
- Gauge
- Frog, Railway
- Fish Plate
- Block-Signal System
- Air Brake
- Buffer, Buffing Apparatus
- Bumping Posts
- Snow-Plow

### RIVER AND HARBOR IMPROVEMENTS.

Various important works to aid maritime commerce consist in the erection of numerous harbor and river im-

provements. These are of a permanent character and require special engineering. Such works are described in the list below:

- Lighthouse
- Buoy
- Jetty
- Breakwater
- Embankments
- Cofferdam
- Foundation
- Dike
- Harbor
- Dredge
- Levee
- Dock
- Pile
- Excavating Machinery
- Blasting
- Caisson
- Masonry
- Retaining Walls
- Quay

#### CANALS.

When canals are carried across an isthmus, as at Suez or Panama, they may involve also many of the essential characteristics of harbor improvements; yet such works show considerable variation, and, when ordinary inland canals or those in connection with an irrigation system are considered, the methods of construction are quite different. The following list suggests a line of topics that could with profit be consulted:

- Canal
- Irrigation
- Panama Canal
- Nicaragua Canal
- Suez Canal
- Corinth Canal
- Erie Canal

- New York State Barge Canal
- Cape Cod Canal
- Saint Mary's Canal
- Welland Canal
- Chicago Drainage Canal
- Trans-Isthmian Canal
- Ship Railway

#### WATERWORKS AND HYDRAULIC ENGINEERING.

The use of water practically involves a separate department of engineering, but one in contact at many points with civil, sanitary, mechanical, and electrical engineering. It is necessary first to consider WATER SUPPLY, or the sources of water, then its storage, transmission, purification, distribution, and final consumption, and also various devices that are employed in these different stages. The material on this subject in the *New International Encyclopædia* is represented in the following list:

- Water Supply
- Hydrography
- Well-Sinking
- Artesian Wells
- Dams and Reservoirs
- Hydrostatics
- Hydrodynamics
- Current-Meter
- Weir
- Irrigation
- Pipe
- Water Purification
- Water-Works
- Fire Protection
- Pumps and Pumping Machinery
- Valve
- Water Power
- Filter and Filtration
- Accumulators
- Hydraulic Ram
- Water Wheel and Turbines



Hydraulic Press  
 Archimedes' Screw  
 Danaide  
 Hydraulic Pressure Engine  
 Water Meters  
 Hydraulic Elevator (under Elevator)

#### SANITARY SCIENCE.

Under this somewhat comprehensive title, may be included such schemes as tend to improve and safeguard the health of mankind. See:

Hygiene  
 Diet  
 Occupational Diseases  
 Schools, Medical Inspection of  
 Health, Boards of  
 Sanitary Commission  
 Sanitary Laws  
 Quarantine  
 Water Supply  
 Water-Works  
 Water Purification  
 Plumbing  
 Garbage and Refuse Disposal  
 Sewage Disposal  
 Sewerage  
 Disinfectants  
 Drainage  
 Catch-Drains  
 Heating and Ventilation  
 Bath-Houses, Municipal  
 Slaughter Houses  
 Burial  
 Cemetery  
 Cremation of the Dead  
 Health Association, American Public

#### MUNICIPAL ENGINEERING.

The various applications of engineering knowledge to a large city result in the solving of many problems, such as water supply, transportation, the

provision of PARKS and PLAYGROUNDS for the masses, etc., and especially the fundamental ones involved in CITY PLANNING, which are now engrossing the attention of many American cities. These subjects, grouped from this point of view, will be found in the following list:

City Planning  
 Road  
 Street  
 Boulevard  
 Road and Street Machinery  
 Asphalt  
 Pavement  
 Subways  
 Electric Railways  
 Street Railways  
 Urban Transportation  
 Water-Works  
 Illumination  
 Electric Lighting  
 Parks and Playgrounds  
 Landscape Gardening  
 Recreation Piers  
 Bath-Houses, Municipal  
 Garbage and Refuse Disposal  
 Municipal Ownership  
 Public Utilities

See also preceding section on Sanitary Science.

#### FIRE PROTECTION.

The surest fire protection is FIRE-PROOF CONSTRUCTION for buildings, seen at its best in STEEL SKELETON CONSTRUCTION, where combustible material is reduced to a minimum. Then there are SAFES and SAFE DEPOSIT VAULTS for valuables, and the use of INCOMBUSTIBLE FABRICS. When these safeguards are unavailing, however, recourse must be had to the various apparatus for fighting fire, such as the

**FIRE-ENGINE**, now seen in its self-propelled form, the motor fire-engine, the high pressure pumping service, the **FIRE-EXTINGUISHER**, etc. See:

Fireproof Construction  
Safes and Safe Deposit Vaults  
Fireproofing  
Incombustible Fabrics  
Fire-Alarm  
Fire Protection, Municipal  
Fire-Engine  
Fire-Extinguisher

#### MECHANICAL ENGINEERING.

For raising and transporting materials, and for carrying on other important operations, many interesting mechanical devices are constructed. The **CABLEWAY**, **TELPHERAGE**, **DERRICK**, and **TRAVELING SIDEWALK** are typical of the former class, while **GRINDING** AND **CRUSHING MACHINERY** and **AIR COMPRESSOR** may be cited as divisions of the many branches of mechanical engineering. A list of such subjects as are not already cited under other heads includes:

Derrick  
Crane  
Cableway  
Telpherage  
Ropeway  
Traveling Sidewalk  
Elevator  
Air Compressor  
Blowing-Machines  
Pneumatic Dispatch  
Power, Transmission of  
Dynamometer  
Brake  
Prony Brake  
Air Brake  
Lubricants  
Wood-Working Machinery

#### MECHANICAL DEVICES.

In the construction of machinery there are certain elementary parts that enter into its design. These serve such purposes as changing the direction of a motion, increasing or reducing speed, or permitting its control in any desired way. See:

Mechanical Powers  
Axle  
Shafting  
Wheel and Axle  
Lever  
Pulley  
Crank  
Cam  
Eccentric  
Winch  
Windlass  
Inclined Plane  
Wedge  
Toggle Joint  
Screw  
Endless Screw  
Belt  
Gear-Wheel  
Gearing  
Couple

#### PRIME MOVERS.

For the generation of power there are a number of sources to be considered. **HEAT**, **STEAM**, **ELECTRICITY**, **WATER POWER**, **WIND**, etc., are all treated in their proper places, but under this head may conveniently be included articles describing the means for transforming energy into mechanical power available for a thousand and one different purposes. See:

Hot-Air Engine  
Compressed-Air Engine  
Compressed-Air Locomotive  
Gas-Engines

**Internal-Combustive Engines**

Motor Vehicle

Fireless Engine

Steam Engine

Steam Turbine

Water Wheel

Windmill

Hydraulic Ram

Hydraulic Press

Hydraulic-Pressure Engine

Dynamo-Electric Machinery

Mechanical Powers

**STEAM AND STEAM ENGINE.**

Commencing with a consideration of the properties of steam, any discussion soon reaches the **STEAM ENGINE** and its various parts and its applications. Such will be found in the classification given below :

Steam

Boiler

Economizers

Shaking Grates

Æolipile

Steam Engine

Locomotive

Steam Navigation

Steam Turbine

Pumps and Pumping Machinery

Eccentric

Crank

Fly-Wheel

Governor

Valve

Injector

Indicator

Safety Valve

Condenser

Horse-Power

**ELECTRICAL ENGINEERING.**

In **Electrical Engineering**, we may include the generation and distribution

of electric current, also its use for light and power, and the methods by which it is transmitted to considerable distance. The subject is treated in the following articles :

Dynamo-Electric Machinery

Armature

Cable, Electric

Transformer

Synchronizer

Transmission of Power

Electric Lighting

Electric Furnace

Electric Heater

Electric Railways

Urban Transportation

Electro-Chemistry

Storage Battery

Electrolysis

Welding

Lightning-Arresters

Electric Fuse (under Fuse)

For a discussion of the phenomena of the electric current, see the comprehensive section on **Electricity** in the chapter on **Physics**.

**TOOLS.**

Many and varied tools have been and are used by the mechanic, which are discussed in the articles dealing with the various industries. Certain groups and individual tools, however, demand consideration. Thus, **METAL** and **WOOD-WORKING MACHINERY** include many important tools, the chief types of which it is desirable to understand. **PNEUMATIC TOOLS** have resulted in considerable saving of labor and are of increasing importance. Many tools, such as the file, hammer, and axe, still survive and are not yet

replaced by machinery. The list in alphabetical order is as follows:

Axe  
Boring Machinery  
Calipers  
Cutlery  
Drill  
File  
Hammer  
Jack  
Mandril  
Marlinespike  
Metal-Working Machinery  
Micrometer  
Plane  
Pneumatic Tools  
Sand Blast  
Sandpaper  
Saw  
Sawmill  
Screw  
Wood-Working Machinery

#### **TELEGRAPH AND TELEPHONE.**

The transmission of intelligence is constantly being accomplished more effectively and by a greater variety of methods, specialization having its play here as in other branches of applied electricity. The following articles may be recommended as supplying a complete idea of the history and development of these important processes:

Telegraph  
Signaling and Telegraphing, Military  
Lightning-Arresters  
Telautograph  
Telegraphy, Submarine  
Atlantic Telegraph  
Wireless Telegraphy  
Telephony  
Coherer  
Telephone

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## Chapter 29. Efficiency and Industrial Management

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**W**HILE few terms have been more abused in recent years than the word "Efficiency," which may be interpreted all the way from implying some occult science for making two blades of grass grow where one or even less previously flourished, to some simple means for securing greater output of a factory or business, it may be understood, however, in its strictly technical sense, as the ratio of the actual to the possible, or output to input. In such studies are involved much that can result and be interpreted to the advantage of mankind, so that in mathematical language a condition will be realized where this ratio will approach nearer to unity. For true efficiency there must be a knowledge both of the actual and the possible, expressed exactly and quantitatively, and then the employment of various means to eliminate waste and lost motion, so that the enterprise shall be more productive and yield greater returns, both gross and net. To accomplish this there are various methods, differing as to their manner and as to the claims advanced for their merits and workability, yet essentially the same if examined as regards their psychological and philosophical fundamentals.

Accordingly, when one investigates the subject of **SCIENTIFIC MANAGEMENT** he must first learn its objects and then appreciate wherein it is scientific, and then determine the various methods and schools of thought that have developed to secure these objects. Therefore, the student in this field should consult the fundamental articles on **EFFICIENCY** and **INDUSTRIAL MANAGEMENT**, but he will find also that in addition he will be required to inform himself as regards **BOOKKEEPING** and **ACCOUNTING**, for all studies in this field must depend upon records and bear a relation to the final system of accounts and values that show the profit of the enterprise. Accordingly, one might suggest the following list of titles that develop this interesting field of modern thought:

Efficiency  
Industrial Management  
Scientific Management  
Legislative Management  
Premium Plant  
Motion Study  
Time Study  
Task and Bonus  
Unit System

The articles **BOOKKEEPING** and **ACCOUNTING**, previously mentioned, should be read and also that on **RAILWAYS**, where, in the case of American railways, there has been much dispute as to the degree of efficiency that is secured in their operation, the principles of scientific management being designed to find application here if anywhere.

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## 30. Military and Naval Science

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**A**S the purpose of an army or any military organization is to carry on, or at least be prepared to carry on, war, either of defense or of offense, as effectively as possible, a study of the topic WAR, to ascertain under what circumstances recourse is had to the court of arms and under what conditions the laws and usages of nations demand that war shall be waged, makes a fitting beginning for reading in this field. Then, coming to the actual operations of war, we find that they must be planned according to the principles of STRATEGY and executed along lines worked out in systems of TACTICS. Accordingly, then, a suitable grouping of allied subjects is as follows:

### A. Armies

War	Point d'Appui
Strategy	Retreat
Tactics, Military	Base of Operations
Military Aeronautics	Advance Guard
Attack	Cavalry Screen
Assault	Outposts
Fire	Picket
Battle	Patrol
Engagement	Guard
Skirmish	Main Guard
Invasion	Rear Guard
Blockade	Flank
Fortifications, Attack and Defense of	Reconnaissance
Siege	Prisoner
Sap	Contraband of War
Bombardment	
Coast Defense	ORGANIZATION.
Manœuvres	To carry out, however, any scheme of
Evolutions, Military	strategy and tactics involves an army
Demonstration	whose effectiveness depends upon its or-
Marching	ganization. In the organization of an
Manual of Arms	army, the INFANTRY, CAVALRY, and
À Cheval Position	ARTILLERY, or LINE, must be consid-
Ambuscade	ered. These are its prime essentials,
Ambush	together with its ENGINEERS, MEDICAL
Debouching	DEPARTMENT, COMMISSARIAT, Depart-
Échelon	ment of the QUARTERMASTER, SIGNAL
Enfilade	CORPS, Bureau of Military Justice, or
Feint	Judge Advocate's Department, its Pay
	Corps, GENERAL STAFF, and the vari-

ous other bureaus and departments upon the efficiency of which the successful organization and operation of a military body depend.

Looking at military organization from the point of view of the units of which an army is made up, we may start with the Corps, and gradually proceed from one command to an inferior one, learning the function of each and its relation to the common whole. RANK AND COMMAND is the keystone of military organization. Over each body of men there must be an appropriate officer, and to learn his duties it is but necessary to consult the article on this subject. In addition to officers, there may be certain subordinate individuals who have peculiar or individual functions to perform; these too are best described under their own heads. The accompanying lists suggest the relation of many of these topics. Dealing first with the division which may be headed Armies and Army Organization, we find large and adequate treatment, the historical side here as well as elsewhere in the Encyclopædia being considered. The first group deals with the divisions of military organization, the second, entitled RANK AND COMMAND, with the individuals of all ranks that form an army. See:

(a) *Armies and Army Organization:*

Army Organization  
Armies  
Corps  
Division  
Brigade  
Regiment  
Battalion  
Squadron  
Company

Battery  
Platoon  
Detachment  
Artillery  
Artillery Corps  
Artillery Train  
Cavalry  
Infantry  
Mounted Infantry  
Engineer Corps  
Medical Department, United States Army  
Medical Department, United States Navy  
Ambulance  
Hospital Corps  
Signal Corps  
General Staff  
Staff  
Military Police  
Band, Military  
Pioneer  
Sharpshooter  
Color-Guard  
Reserve  
Cadre  
Contingent  
Column  
Militia  
Landwehr  
War, Department of  
Horse Guards  
Life Guards  
United States Army (under United States)

(b) *Rank and Command:*

Field-Marshal  
General  
Lieutenant-General  
Major-General  
Brigadier-General  
Colonel  
Lieutenant-Colonel

Major  
Captain  
Lieutenant  
Cadet, Military  
Cadet, Naval  
Adjutant-General  
Adjutant  
Aide-de-Camp  
Commissary  
Quartermaster  
Paymaster  
Surgeon, Military  
Inspector-General  
Chaplain  
Contract Surgeon  
Commander-in-Chief  
Commandant  
Field Officer  
Ensign  
Cornet  
Non-Commissioned Officer  
Color-Sergeant  
Drum Major  
Sergeant  
Corporal  
Gunner  
Artificer  
Drummer  
Orderly  
Private  
Bombardier  
Sentinel

**MILITARY ENGINEERING.**

To the military engineer are assigned many problems connected with the existence and operation of an army. He has to provide for its protection in both peace and war, which involves the construction of suitable barracks, camps, and fortifications, both temporary and permanent, and is besides required to study and delineate the country in which the troops live or operate.

Naturally, the chief division to be made in the topics relating to this subject is **FORTIFICATION**, involving the construction of more or less permanent works, and **Field Engineering**, dealing with those of a more temporary character. See:

Engineering, Military  
Fortification  
Military Architecture  
Battery  
Bastion  
Berm  
Blockhouse  
Caponiere  
Casemate  
Coast Defense  
Embrasure  
Epaulement  
Traverse  
Stockade  
Enccinte  
Frontier, Military  
Trench, Military  
Escarp  
Gallery  
Magazine  
Martello Tower  
Orillon  
Abatis  
Bill-Hook  
Blindage  
Barricade  
Cheveaux-de-Frise  
Fascines  
Gabion  
Approaches  
Parallels  
Siege and Siege Works  
Demolition  
Breach  
Camp  
Bridges and Docks, Military  
Mines and Mining, Military



Redoubt  
Retrenchment  
Revetment  
Redan

#### FORTS OF THE UNITED STATES.

With a description of the principles of Fortification and Military Encampments, or posts, may properly be included a description of such military posts of the United States as are of importance for one reason or another. These are included in the following list, and the articles give information as to their location, garrison, general characteristics, etc.

Fort Adams  
Fort Bliss  
Fort Canby  
Fort Caswell  
Fort Clark  
Fort D. A. Russell  
Fort Douglas  
Fort Du Pont  
Fort Ethan Allen  
Fort Flagler  
Fort Grant  
Fort Greble  
Fort Hamilton  
Fort Hancock  
Fort Howard  
Fort Jay  
Fort Keogh  
Fort Leavenworth  
Fort Logan  
Fort McHenry  
Fort McPherson  
Fort Meade  
Fort Monroe  
Fort Morgan  
Fort Myer  
Fort Porter  
Fort Preble  
Fort Riley

Fort Robinson  
Fort Sam Houston  
Fort Schuyler  
Fort Sheridan  
Fort Snelling  
Fort Stevens  
Fort Strong  
Fort Terry  
Fort Thomas  
Fort Totten  
Fort Trumbull  
Fort Wadsworth  
Fort Warren  
Fort Washington  
Fort Wayne  
Fort William H. Seward  
Fort Yellowstone  
Columbus Barracks  
Jefferson Barracks  
Madison Barracks  
Plattsburg Barracks  
San Diego Barracks  
Vancouver Barracks  
Washington Barracks

#### ORDNANCE AND GUNNERY.

To carry on warfare, many weapons and resources have been placed at the disposal of the soldier. Such titles as ARTILLERY, ORDNANCE, EXPLOSIVES, AËROPLANES, SUBMARINES, GUNPOWDER, PROJECTILES, SMALL ARMS, naturally suggest themselves as principal topics. With them may be grouped the underlying science as embodied in BALLISTICS and GUNNERY, together with the other topics contained in the following list:

##### (a) *Artillery:*

Coast Artillery  
Field Artillery  
Horse Artillery  
Mountain Artillery

Siege Gun  
 Guns, Naval  
 Rapid-fire Guns  
 Machine Gun  
 Mitrailleuse  
 Gardner Gun  
 Mortar  
 Howitzer  
 Air Gun  
 Pneumatic Gun  
 Submarine Gun  
 Ordnance  
 Ordnance Establishments  
 Cannon  
 Jacket  
 Bore  
 Calibre  
 Artillery Carriages  
 Gun-Carriage  
 Limber  
 Caisson  
 Small Arms  
 Carbine  
 Chassepôt  
 Arquebus  
 Bayonet  
 Pistol  
 Revolver  
 Target and Target Practice  
 Sword

(b) *Projectiles:*

Ammunition  
 Grape-Shot  
 Case-Shot  
 Canister  
 Carcass  
 Grenade  
 Bomb  
 Shrapnel  
 Rocket  
 Cartridge  
 Torpedo

(c) *Explosives:*

Gunpowder  
 Smokeless Powder  
 Dynamite  
 Nitroglycerin  
 Atlas Powder  
 Cordite  
 Lyddite  
 Maximite  
 Picric Acid  
 Dualine  
 Fulminates  
 Fulminate of Mercury  
 Fulminate of Silver  
 Pyrotechny  
 Primer  
 Fuze  
 Greek Fire  
 Charge  
 Matches

(d) *Gunnery:*

Ballistics  
 Range  
 Range-Finder  
 Aim  
 Charge  
 Plongée  
 Ricochet  
 Target and Target Practice  
 Target Practice, Naval  
 Proving Ground  
 Loading-Tray

(e) *Historic Cannon:*

Coehoorn  
 Columbiad  
 Demi-Cannon  
 Demi-Culverin  
 Falcon  
 Jingal  
 Mitrailleuse

UNIFORM AND EQUIPMENT.

Closely connected with the soldier's

and sailor's weapons are his Uniform and Equipment, the various insignia often being matters of considerable interest and curiosity to the layman. With these subjects, we may include allied topics as follows:

- Military Insignia
- Uniforms, Military and Naval
- Aiguillettes
- Bandolier
- Busby
- Canteen
- Cartouch
- Chevrons
- Epaulet
- Facings
- Good Conduct Badges
- Haversack
- Helmet
- Képi
- Khaki
- Kit
- Knapsack
- Spur
- Sword

#### MILITARY CEREMONIES.

As a witness of various military ceremonies or other formalities, the layman comes in contact with certain other aspects of army and navy life. The more important of these will be treated under their respective heads. See the following:

- Salutes
- Feu-de-Joie
- Dress Ship
- Escort
- Review
- Inspection
- Parade
- Muster

#### FLAGS.

Flags of one kind or another, by rea-

son of their histories and tradition and their special uses at the present time, play an important part in military and naval affairs. Besides being the emblem of the nation, they may also pertain to various organizations or individuals, as the colors of a regiment or the flag of an admiral. These will be understood on reference to the following articles, many of which are illustrated by colored plates:

- Flag
- Ensign
- Colors
- Guidon
- Standard
- Pennant
- Jack
- Union Jack
- Flag of Truce
- Signaling and Telegraphing

#### HISTORIC AND SPECIAL MILITARY ORGANIZATIONS.

Military organizations in the past, as well as in the present, have been formed either for special purposes or under special auspices, or as independent commands. Some of the more famous classes of soldiers and historic military organizations are those included in the following list:

- Artillery Company, Ancient and Honorable
- Artillery Company, Honorable
- Bashi-Bazouks
- Beefeater
- Bersaglieri
- Black Watch
- Cameronians
- Carbineers
- Chasseurs
- Cohort
- Coldstream Guards

Colonial Corps  
Cossacks  
Cuirassier  
Dragoons (under Cavalry)  
Equestrian Order  
Fencible  
Foot Guards  
Francs-Tireurs  
Fusiliers  
Green Mountain Boys  
Grenadier  
Grenadier Guards  
Guard  
Guerrillas  
Guide  
Gurkhas  
Highlanders  
Honvéd  
Horse Guards  
Household Troops  
Hussars  
Janizaries  
Lancer  
Landsturm  
Landwehr  
Legion  
Life Guards  
Mamelukes  
Minute Men  
Mobiles, Corps of  
National Guard  
Phalanx  
Rangers, Mounted  
Rifleman  
Rough Riders Association  
Scots Greys  
Sepoy  
Sikhs  
Spahis  
Streltsi  
Trainbands  
Voltigeurs  
Yeomanry  
Yeomen of the Guard

## Zouaves

## MILITARY LAW.

For the government of the army there are certain statutes and regulations. International law in many of its aspects touches on the acts of armies in the field. Accordingly, a grouping of certain topics allied, though not necessarily logically connected, may be made as follows:

Military Law  
Acts of Hostility  
Allegiance  
Armistice  
Articles of War  
Belligerent  
Blockade  
Booty  
Bounty  
Capitulation  
Cartel  
Cashiering  
Casus Belli  
Conscription  
Contraband of War  
Council of War  
Courts Military  
Declaration of War  
Desertion  
Discharge  
Judge-Advocate  
Judge-Advocate-General  
King's Regulations  
Martial Law  
Military Commissions  
Military Government  
Military Law  
Military Police  
Military Prison  
Neutrality  
Posse Comitatus  
Prisoner  
Privateering

Prize  
Prize Courts  
Provost-Marshall  
Ransom  
Spy  
Truce  
War

#### MILITARY AND NAVAL EDUCATION.

The professions of the soldier and sailor require from beginning to end continual training, and from Academy to War College there are many studies to be pursued. Grouping those topics referring to the education of the soldier and sailor, we have the following list:

Army Schools  
Artillery Schools  
Cadet, Military, Naval  
Military Geography  
Cavalry and Light Artillery School  
Military Education  
Military Academy, U. S.  
General Service and Staff College  
Staff Colleges and Schools  
War College  
Naval Academy, U. S.  
Naval Schools of Instruction  
Naval Institute, U. S.  
Discipline  
Drill  
Drill Regulations

#### MISCELLANEOUS.

The food for the soldier and his animals is discussed under **RATIONS** and **FORAGE**, and its mode of preparation

under **FIELD COOKING**. The principal **BUGLE AND TRUMPET CALLS** that summon him to his duties are given with the music notes, and the **DRUM** and **FIFE**, which supply the field music, are also treated. Methods of **RECRUITMENT** in various countries, and also **RETIREMENT**, should be studied, while the **PAY AND ALLOWANCES** of the soldier must be considered in order to understand army conditions at home and abroad. An essential of modern military operations is the maintenance of communication between every part of an army and its base, or capital. This is the function of the **SIGNAL CORPS**, whose operations and apparatus are treated under **SIGNALING AND TELEGRAPHING, MILITARY**. In the event of casualties, the **SURGEON** and the **MEDICAL DEPARTMENT**, with its **HOSPITAL CORPS**, are called into requisition, protected as they are by the terms of the **GENEVA CONVENTION**. It is advantageous to learn the present conditions of **SURGERY, MILITARY**, and the peculiar problems that the military surgeon has to face, as well as his methods of operation. In this connection, also, should be mentioned the work of the **RED CROSS**, and the part it plays in alleviating suffering on the battlefield. Of importance, as in a small way reproducing some of the conditions of warfare, the **WAR GAME** is worthy of consideration, as on its board may be worked out many interesting problems in strategy and tactics.

## B. Ships and Navies

No clearer distinction can be drawn in discussing vessels for navigating the seas than to consider separately those

for military purposes and those for commerce, but it is not always possible to make the separation complete,

and many subjects concerning nautical affairs cover or apply to both classes. Under NAVIES and SHIP AND SHIPPING (subhead *Ship, Armored*) are given historical accounts of the development of war craft, while the evolution of the merchant ship is traced under NAVIGATION, SHIPBUILDING, and SHIP AND SHIPPING (subhead *Power Navigation*). In the following lists the different kinds of warships, merchantmen, and boats which are separately described under their own titles are collected under the proper head:

(a) *Warships:*

Warship  
Ship, Armored (subhead under Ship and Shipping)  
Battleship  
Cruiser  
Fuel Ship  
Gunboat  
Torpedo Boat  
Torpedo Boat, Submarine  
Hospital Ship  
Ram  
Guard-Ship  
Receiving Ship  
Galley  
Galliot  
Tireme  
Fire-Ship  
Floating Battery  
Frigate  
Monitor  
Mortar Vessel  
Corvette

(b) *Merchantmen:*

Ship and Shipping and its various subheads  
Power Navigation (subhead under Ship and Shipping)  
Clipper

Bark  
Brig  
Schooner  
Sloop  
General Ship  
Composite Ships  
Lighter  
Whaleback  
Yacht  
Lugger  
Junk  
Grab  
Dhow  
Corsair  
Ketch  
Pinnace  
Pirogue  
Pram  
Great Eastern  
Launch, Launching  
Derelict  
Wreck

(c) *Boats:*

Lifeboat  
Life-Rafts  
Balsa  
Launch  
Whaleboat  
Long Boat  
Jolly-Boat  
Punt  
Cutter  
Catboat  
Canoe  
Catamaran  
Banca  
Ice-Breaking Steamer  
Barca  
Kayak  
Ferry

NAVIES, NAVAL AFFAIRS, ETC.

There is included under this head, in the following lists, articles pertain-

ing not only to the navy proper, but to such government services as are connected with naval and nautical affairs, such as Coast Guard, Life-Saving Service, etc.:

*(a) Organization and General Subjects:*

Navies  
Tactics, Naval  
Marine Corps  
Engineer, Naval  
Medical Department, United States Navy  
Hydrographic Office  
Navy, Department of the  
Naval Academy  
Naval Schools of Instruction  
Naval College of Canada  
Revenue Cutter Service, United States  
Life-Saving Service  
Coast Guard  
Naval Reserve  
Crew  
Company, Ship's  
Complement  
Watch  
Division  
Landing Force  
Billet  
Mess  
Pay and Allowances  
Naval Reserve

*(b) Officers and Men:*

Admiral  
Commodore  
Captain  
Commander  
Lieutenant-Commander  
Lieutenant  
Ensign  
Midshipman  
Clerk, Paymaster's

Commanding Officer  
Commandant  
Flag-Officer  
Executive Officer, United States Navy  
Surgeon, Military and Naval  
Paymaster  
Watch Officer  
Naval Constructors  
Chaplain  
Provost-Marshal  
Pilot  
Warrant Officer  
Gunner  
Master  
Master-at-Arms  
Mate  
Carpenter, Navy  
Boatswain  
Machinist, Naval  
Petty Officer  
Quartermaster  
Coxswain  
Naval Apprentice  
Landsman  
Boys, Ships'

*(c) Naval Ordnance, Gunnery, Torpedoes, etc.:*

Guns, Naval  
Gunpowder  
Smokeless Powder  
Guncotton  
Rapid-fire Guns  
Machine Guns  
Target Practice  
Target  
Torpedo  
Torpedo Director  
Torpedo Net  
Rangefinder  
Stadimeter  
Projectile  
Mine, Submarine

(d) *Merchant Marine and Allied Subjects:*

Navigation  
 Merchant Marine (of U. S.)  
 Ship and Shipping, subheads of:  
   Sailing Ship  
   Power Navigation  
   Classification of Ships for  
     Marine Insurance  
   Tables showing tonnage of  
     ships built and building in  
     the merchant navies of the  
     world  
 Great Eastern  
 Load-line Marks of Vessels  
 Measurement of Ships for Ton-  
   nage  
 Safety at Sea  
 Rules of the Road at Sea  
 Fog Signals  
 Coasting Trade  
 Trade, Board of  
 Trinity House  
 Crew  
 Master  
 Mate  
 Pilot

See also the titles grouped under **Maritime Law and Navigation** on subsequent pages.

**SHIPBUILDING AND NAVAL ARCHITECTURE.**

The enormous size and great speed of many modern vessels require study, experience, and scientific attainments of the highest class for their design and construction. Under the head of **SHIPBUILDING** will be found a historical sketch of the subject, a description of the theory of design, of the means and methods of hull construction, and of the design, development, and construction of propelling and

other machinery. The principal titles under which shipbuilding information is to be found are:

Armor Plate  
 Ship and Shipping, and subheads  
 Shipbuilding, and subheads  
 Launch, Launching  
 Navigation  
 Load-line Marks of Vessels  
 Marine Engineering  
 Steam Engine  
 Steam Turbine  
 Boiler  
 Buoyancy  
 Stability  
 Metacentre  
 Resistance  
 Displacement  
 Tonnage  
 Measurement of Ships for Tonnage  
 Lloyds  
 A 1

The various parts of a vessel are almost infinite in number. The articles **SHIPBUILDING** and **SHIP** will tell of these various parts and describe how the skill of naval architect, marine engineer, and shipbuilder unites them into one congruous whole. Such parts, however, often possess distinct features and characteristics which need separate treatment, and these are included in the following list:

Beak  
 Bilge  
 Beam  
 Bottom  
 Bow  
 Bridge  
 Bulkhead  
 Bulwark  
 Cockpit  
 Cofferdam  
 Companion



Deck  
Figurehead  
Gangway  
Hawse  
Helm  
Hold  
Keel  
Keelson  
Paddle-Wheel  
Poop  
Screw Propeller  
Smokepipe

To gain a good idea of the rigging of a ship and the names of masts, sails, etc., the best plan is to consult the plate accompanying the article *SHIP*, where all the various parts of the rigging of a full-rigged ship are indicated and specified. There are various topics connected with sails and rigging that are described and their functions shown in brief articles. Such a list includes the following:

Belay  
Block  
Boom  
Bowsprit  
Brace  
Brail  
Bridle  
Burton  
Clip Hooks  
Cordage  
Crow's-Nest  
Davit  
Gaff  
Halliards  
Jib  
Jury  
Knotting and Splicing  
Lateen Sail  
Lug-Sail  
Mast

Purchase  
Rigging  
Sail  
Spanker  
Spinnaker  
Sprit  
Stay  
Tackle

Connected with the ship, but not wholly falling in any of the above classes, are many essentials such as the *ANCHOR*, the *BINNACLE*, the *DAVIT*, etc. These adjuncts are specially designed for specific purposes, which the reader naturally desires to understand. The following list includes some of the more important subjects in such a grouping:

Anchor  
Ballast  
Batten  
Bells  
Binnacle  
Block  
Boiler  
Boiler (under Shipbuilding)  
Bridle  
Buoy  
Burton  
Cable  
Canvas  
Capstan  
Cat  
Cofferdam  
Compass  
Controller  
Cordage  
Davit  
Fender  
Ground-Tackle  
Mooring Swivel  
Kedge  
Knotting and Splicing

Lifeboat  
Life Buoy  
Life-Preservers  
Life-Rafts  
Life-Saving Guns and Rockets  
Life-Saving Service  
Lights  
Marling Spike  
Oakum  
Purchase  
Rope  
Smokepipe  
Stopper  
Tackle  
Wheel  
Winch  
Windlass

Safety at Sea  
Rhumb Line  
Meridian  
Map  
Loxodrome  
Chart  
Hydrography  
Meteorology, Marine  
Sound, Sounding  
Coast Pilot  
Bowditch's Practical Navigator  
Almanac  
Nautical Almanac  
Ephemeris  
Pilot Chart  
Protractor  
Sextant  
Quadrant  
Vernier

#### NAVIGATION.

Navigation involves the conducting of a vessel from one port to another by making use of charts, the position of various heavenly bodies as determined by the navigator, and such other data as he can obtain by observation and calculation. In general this is contained in the article NAVIGATION, but further details and explanations are given of incidental topics. The following list will be found by the reader sufficiently comprehensive:

Navigation  
Latitude and Longitude  
Sailings  
Binnacle  
Compass  
Log  
Reckoning  
Dead Reckoning  
Day's Work  
Departure  
Deviation  
Fog Signals  
Rules of the Road at Sea

#### SEAMANSHIP.

Seamanship may be distinguished from navigation as dealing with the actual practice, rather than the theory, involving the handling of vessels and the means taken to insure their safety. Thus, under this head, is discussed such important subjects as the RULES OF THE ROAD, the use of the LOG, TACKING, jibing, mooring, and the various manœuvres and operations carried on at sea and in port. These hardly fall in a logical order, but the more important are contained in the following list:

Tacking and Wearing  
Jibe  
Boxhauling  
Lec  
Leeway  
Moor, Mooring  
Log  
Log-Book  
Helm

Steering  
Port  
Larboard  
Starboard  
Bearing  
Sound, Sounding

#### MARITIME LAW.

Vessels sailing on the high seas are governed by rules and usages which have given rise to a body of laws known as admiralty and maritime law. Furthermore, such vessels are required to observe the statutes of the countries whose flags they fly, and such formalities as are duly prescribed. Connected with such governmental regulations are those of marine underwriters and insurance principles, forming a large department of maritime law. Interests at sea are also considered by international law, and prizes and privateering are subjects which it must consider. A grouping of interesting topics in these more or less related branches is as follows:

International Law  
Admiralty Law  
Maritime Law  
Navigation Laws  
Navigation, Freedom of  
Ship's Papers  
Manifest  
Bill of Lading  
Clearance  
Bill of Health  
Charter-Party  
Cargo  
Freight  
Demurrage  
Admiralty, The

Bounty  
Collisions of Vessels  
Bottomry Bond  
Respondentia  
Salvage  
Derelict  
Wharfage  
Jettison  
Barratry  
Quarantine  
Marine Insurance  
Lloyds  
A 1  
Measurement of Ships for Tonnage  
Tonnage  
Load-line Marks of Vessels  
Privateering  
Prize  
Prize Courts  
Desertion  
Safety at Sea

As the sailor must make his base of operations on shore, it is proper to consider such subjects as NAVY YARDS, DOCKS, etc., where he may secure supplies and protection. The following list indicates certain articles that will be of assistance in this respect:

Navy Yard  
Dockyards, Royal  
Arsenal  
Reef  
Harbor  
Breakwater  
Dock  
Wharf  
Torpedo Station  
Naval Academy

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# Chapter 31. The Great War

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**T**HE WAR IN EUROPE is treated in an article that has been written by some of the best experts obtainable, and is a complete history of it in all its phases. It is divided into the following subdivisions: I, Underlying Causes; II, Outbreak of the War; III, Military Operations; IV, Naval Operations; V, Aërial Operations; VI, Alleged Atrocities in the War; VII, Destruction of Art and Architecture; VIII, Neutral Nations; IX, Relief Measures; X, Financial and Economic Aspects; XI, Bibliography. It is the purpose of this chapter to supplement the cross-references in the article itself, with a complete list of articles in the NEW INTERNATIONAL ENCYCLOPÆDIA, which deal directly or indirectly with the war.

On June 28, 1914, Archduke Francis Ferdinand, the Austrian heir apparent, was assassinated with his wife at Sarajevo, the capital of Bosnia. This was the match that touched off the conflagration which had been brewing in Europe for years. Austria-Hungary, accusing Serbia of complicity in the affair and declaring that it was the Serb aim to secure the provinces of Bosnia and Herzegovina, sent an ultimatum to Serbia on July 23. Serbia's reply, delivered just before the expiration of the time limit, only partially complied with Austria-Hungary's demands. Despite the most strenuous efforts on the part of the larger countries of Europe, Austria-Hungary declared war on Serbia on July 28. Russia, the champion of the Slav Balkan States, issued an order of mobilization and, upon the refusal to withdraw this order, Germany declared war on her. This turned all Europe into an armed camp. France and England came to the aid of Russia, and Germany stood by her ally, Austria-Hungary. Italy, claiming that her Alliance with Germany and Austria-Hungary was purely defensive and claiming further that Austria-Hungary's declaration of war on Serbia was offensive, refused to join her partners in the Triple Alliance. Rumania joined the Entente in August, 1916, and, as a result of the unrestricted submarine warfare announced by Germany on January 31, 1917, the United States declared war against her on April 6, 1917. A list of additional belligerents is given in the section, OUTBREAK OF THE WAR.

## I. Underlying Causes

The Underlying Causes of the Great War fall naturally under three heads, namely: (1) National Antagonisms, (2) Militarism, and (3) Economic Rivalry.

### 1. NATIONAL ANTAGONISM.

The problem of national antagonism was an outgrowth of the Congress of Vienna, which concluded the French Revolution and Napoleonic periods. At this Congress many of the diplomats hoped that the principles of the French Revolution would be recognized and that the ruling ideas would be the recognition of the growth of democracy and the realization of national liberty. Because of the opposition of the reactionaries, particularly Metternich, these

ideas were subjugated and the attempt was made to restore the *ancient régime*. Thus we find the problem of nationality cropping up continually in the nineteenth century. Two examples of this will suffice to show the truth of this statement. As a result of the FRANCO-GERMAN WAR, Germany annexed Alsace and Lorraine, French-speaking territories. At the CONGRESS OF BERLIN, Russia's hopes of making the Balkan peninsula a Slav sphere of influence were frustrated by the jealousy of the other European powers. The French consequently hoped for the day of restoration and the national awaking of Russia foreshadowed her expansion to the Mediterranean. It might be mentioned, in passing, that if the principle of nationality was to be loyally carried out, the heterogeneous Austro-Hungarian Empire would be completely divided up among its neighbors, Transylvania to Rumania, Austria, proper, to Germany, etc.

Consult the following list of articles for a history of the growth of national antagonisms since the beginning of the nineteenth century:

- |  |                                     |
|--|-------------------------------------|
| French Revolution  | Cavour                              |
| Napoleon I   | Mazzini                             |
| Peninsula War  | Garibaldi                           |
| Tugenbund  | Eastern Question                    |
| Vienna, Congress of  | Russo-Turkish War                   |
| Alexander I (Russia)   | Berlin, Congress of                 |
| Charles XIV John (Sweden)                                    | Pan Slavism                         |
| Stewart, Robert (Second Marquis of Londonderry, Castlereagh) | Pan-Germanism (under War in Europe) |
| Wellington, A. W.  | Africa                              |
| Hardenberg, K. A.  | Turco-Italian War                   |
| Humboldt, K. W.  | Balkan War                          |
| Metternich, C. W. N. L.                                      |                                     |
| Nesselrode, K. R.  |                                     |
| Stein, H. F. K.  |                                     |
| Talleyrand-Perigord, C. M.                                   |                                     |
| Crimean War  |                                     |
| Declaration of Paris   |                                     |
| Paris, Treaties of   |                                     |
| Seven Weeks' War   |                                     |
| Schleswig-Holstein   |                                     |
| Bismarck-Schönhausen, K. O. E. L.                            |                                     |
| William I (Germany)  |                                     |
| William II (Germany)   |                                     |
| Franco-German War  |                                     |
| Alsace   |                                     |
| Lorraine   |                                     |
| Benedetti, Vincent   |                                     |
| Napoleon III   |                                     |

In order to learn the part played by individual countries during the nineteenth and early twentieth centuries, as well as to find such important historical material bearing on national antagonisms as the unification of Italy (under ITALY), the Graeco-Turkish War of 1897 (under GREECE), etc. See the historical sections of the following:

- Albania
- Austria-Hungary
- Belgium
- Bosnia
- Bulgaria
- Denmark

France  
 Germany  
 Greece  
 Herzegovina  
 Italy  
 Montenegro  
 Netherlands  
 Norway  
 Poland  
 Portugal  
 Rumania  
 Russia  
 Sardinia  
 Servia  
 Sicilies, Kingdom of the Two  
 Spain  
 Switzerland  
 Turkey  
 United Kingdom of Great Britain  
 and Ireland

For the biographies of statesmen, soldiers, etc., prominent during the war see the treatment of the countries involved in Chapter I of this volume. Supplementary to the lists given there are the additional biographical footnotes at the bottom of the pages of the War in Europe article.

## 2. MILITARISM.

Militarism, as defined in the *NEW INTERNATIONAL ENCYCLOPEDIA*, is "A term employed somewhat loosely to designate a tendency to subordinate civil to military considerations in the policy of the State." We find that all the powers of Europe illustrate this tendency to a greater or less degree. Each has watched any move by the other and attempted to meet any increase in armament by a similar increase. For example, when Germany increased her army in 1913, France passed a law changing the term of ser-

vice to 3 years, because her slowly increasing population would not permit an outright increase. To appreciate the modern tendency, consult the sections on *ARMIES* and *NAVIES* in the articles on the more important countries mentioned above and the following general subjects, which contain also many appropriate cross references:

Militarism  
 Armies  
 Navies  
 Military Education  
 Imperialism  
 Industrialism  
 Peace Movement, International

## 3. ECONOMIC RIVALRY.

For the economic causes of the war it is not necessary to go back further than the beginning of the nineteenth century. Then occurred the Industrial Revolution, which substituted the factory system of manufacture for the cottage system. It also introduced the problem of capital and labor. With the vast increase in production, it was only natural that European countries should look for a market for their goods commensurate with the output. England had a monopoly of manufactures for almost three quarters of a century. Then France, Germany, etc., felt the effects of the revolution and began to look for their "places in the sun." The chief form taken by this economic rivalry was colonization and preferential tariffs. Africa and Asia were partitioned, practically between France and England, thus leaving Germany with no desirable place of expansion. Germany maintained that the adoption of preferential tariffs by the British colonies were attempts to crip-

ple German trade. For history of colonization and the tariff systems see history of countries mentioned *supra* and the following articles:

Political Economy  
Industrial Revolution  
Factories and the Factory System  
International Trade  
Commerce  
Custom's Duties  
Free Trade  
Protection  
Tariff  
Mercantilism  
Reciprocity  
Taxation  
Imperialism  
Imperial Federation  
Industrialism  
Colony  
Canada  
Australia  
India  
New Zealand

Africa  
Union of South Africa  
Egypt  
Morocco  
Tripoli  
German East Africa  
German Southwest Africa  
Kamerun  
Togoland  
Algeria  
Angola  
French West Africa  
Upper Senegal and Niger  
Asia  
Persia  
Afghanistan  
Beluchistan  
China  
Manchuria  
Korea  
Eastern Question  
Far Eastern Question  
Open Door

## II. Military Operations

The military operations in the WAR IN EUROPE are treated under the following main divisions:

I. Introduction and Discussion of Mobilization.

II. Western Theatre, or Campaign against France.

III. Eastern Theatre, or Campaign against Russia.

IV. Southern Theatre or Serbian and Italian Campaigns.

V. Southeastern Theatre or Turkish Campaigns.

For technical subjects, see the chap-

ter on MILITARY AND NAVAL SCIENCE and the following special articles:

Armies (also section under each country)  
Mobilization  
Army Organization  
Artillery  
Cavalry  
Infantry  
Frontier, Military  
Militia  
Military Education  
Military Geography  
Tactics, Military  
Ammunition  
Ballistics

Engineering, Military  
Ordnance  
Fortification  
Battle

Articles which have had special treatment because of the war include the following:

(a) *Western Front:*

Ghent  
Havre  
Huy  
Kiel  
Knocke  
La Bassée  
La Fère  
Lens  
Liège  
Lierre  
Lille  
Longwy  
Lorraine  
Louvain  
Luxemburg  
Lys  
Maubeuge  
Meaux  
Mechlin  
Menin  
Metz  
Meurth-et-Moselle  
Meuse  
Mézières  
Mons  
Montmedy  
Moselle  
Namur  
Nancy  
Nieuport  
Nish  
Novogeorgievsk  
Ostend  
Paris  
Peronne

Piotrokov  
Plock  
Pont-A-Mousson  
Poperinghe  
Posen  
Rheims  
Roubaix  
Roulers  
Roye  
Saarburg  
Saint Dié  
Saint-Quentin  
Soissons  
Souchez  
Tirlemont  
Toule  
Tourcoing  
Valenciennes  
Verdun  
Verviers  
Ypres

(b) *Eastern Front.*

Galicia  
Graudenz  
Ivangorod  
Jaroslau  
Kalish  
Kielce  
Kolmar  
Kolo  
Königsberg  
Krasnick  
Lask  
Lemberg  
Lodz  
Lomza  
Lowicz  
Lublin  
Lyck  
Marienburg  
Marmaros-Szigét  
Masurenland  
Mlawa  
Ostrolenka



Pinsk  
 Poland  
 Przasnysz  
 Przemyśl  
 Rzeszów  
 Saint Petersburg  
 Sambor  
 Shavli  
 Siedlce  
 Silesia  
 Stanislaw  
 Stryj  
 Suczawa  
 Suwalky  
 Tannenburg  
 Tarnopol  
 Tarnow  
 Thorn  
 Tilsit  
 Tomaszow  
 Transylvania  
 Vilna  
 Warsaw  
 Wieliczka

(c) *Southern Front:*

Mostar  
 Pirot  
 Pola

Pozarévatz  
 Prisrend  
 Roveredo  
 Saloniki  
 Scutari  
 Semendria  
 Senlis  
 Sarajevo  
 Shabatatz  
 Tyrol  
 Udine  
 Uskop

(d) *Southeastern Front:*

Kars  
 Khopa  
 Suez Canal  
 Tabriz  
 Transcaucasia  
 Urumia  
 Van

(e) *Colonies:*

German East Africa  
 German Southwest Africa  
 Kiaochow  
 Tahiti  
 Union of South Africa  
 Windhoek

### III. Naval Operations

The naval operations during the Great War took place on almost every known sea. Engagements between fleets were comparatively scarce, until the great battle off Jutland. This engagement, with those off the coast of Chile and near the Falkland Islands, were the most important fleet activities. Outstanding features of the naval operations were the submarine warfare, the spectacular raids on merchantmen, the blockade of Germany and

the transportation of large numbers of troops from one place to another by the Allies. This section of the article is divided into the following divisions:

Operations in the North Sea and the Waters about Great Britain

Operations in the Baltic

Operations in the Mediterranean

Operations in the Black Sea and Dardenelles

Cruiser Operations in the Atlantic, Pacific and Indian Oceans

Naval Strategy of the War  
Some Naval Lessons of the War

For a complete list of the more important articles in the NEW INTERNATIONAL ENCYCLOPÆDIA dealing with naval science, see Chapter 30 in this volume. Some of this might well be mentioned here, together with titles brought into prominence by the war. See also section on *Navies* of the countries involved:

Navies  
Armor Plate  
Battleship  
Ship, Armored  
Torpedo Boat  
Signals, Marine  
Tactics, Naval  
Target Practice, Naval  
Naval Aëronautics  
Naval Reserve  
Naval Schools of Instruction

Naval Stores  
Hartlepool  
Helgoland  
Kaiserwilhelmsland  
Keeling Islands  
Kiaochow  
Kiel  
Libau  
Lissa  
Marshall Islands  
Memel  
New Guinea  
Odessa  
Ragusa  
Reval  
Samoan Islands  
Scarborough  
Sebastopol  
Solomon Islands  
Togoland  
Trebizond  
Varna  
Yarmouth

## IV. Aerial Operations

For the first time in history, aerial operations played an important rôle in warfare. The aerial section of the Great War articles tells the different use to which the different types of aircraft were put. Consult Chapter 17 in this volume dealing with AËRONAUTICS. See:

Aëronautics  
Navigation, Aërial, Law of  
Military Aëronautics

Naval Aëronautics  
Hangar  
London  
Luneville  
Paris  
Saarbrücken  
Sandringham  
Treves  
Trieste  
Venice  
Verona

## V. Neutral Nations

As the war developed it became almost as difficult for a neutral to maintain an attitude of strict neutrality as it was to be a belligerent. The trade

markets of the world were completely upset and all routes and methods of transportation changed entirely. Commerce carrying vessels of the bel-

ligerents were requisitioned for war purposes, and in many neutral countries also political, as well as economical, disturbances resulted. The destruction of neutral vessels, the seizure of neutral mails, etc., brought forth protests from many neutral nations. Besides the historical sections of the neutral nations, such as

Switzerland, Norway, Sweden, the Netherlands, see:

- International Law
- Neutrality
- Armed Neutrality
- Blockade
- Contraband of War
- Declaration of Paris
- London, Declaration of

## *VI. Financial and Economic Aspects*

The problem of financing the Great War proved to be extremely difficult. With trade and industry all but at a standstill, the usual channels for borrowing money were closed. War taxes of all descriptions were levied and old taxes were greatly increased. Large loans were sought at home and abroad. A large joint loan floated in the United States by the Entente Allies was followed by various national loans secured by undoubted collateral, as well as by the resources of the respective governments. The following list includes the more important ar-

ticles which deal with financing a war:

- Tax
- Moratorium
- Credit
- Rediscounting
- Stock Exchange
- Bonds
- Stocks
- Panic, Financial
- Crisis, Economic
- Money
- Marine Insurance
- Bank, Banking
- Foreign Money

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## Chapter 32. Medicine

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**T**HE dissemination of some medical knowledge among the laity is a matter of inestimable social importance. Popular ignorance on the subjects of hygiene, the prevention of disease, and the care of the sick, places many widespread evils sadly beyond the power of the medical profession. The average man's failure, moreover, to appreciate clearly the soundness of the principles and methods of medical science invites the appearance in the community of various mystical, or mystifying, quacks, claiming to know therapeutic methods of all but miraculous efficiency, and offering to sell medicines which, like the philosopher's stone once vainly sought by the alchemists, possess unlimited curative powers. Honest and valuable knowledge to-day has no secrets, and, notwithstanding, or rather because of, really considerable development, is professedly aware of its limitations. Perhaps, therefore, the clearest mark of the impostor or incompetent is the alleged possession of secrets or of methods of universal applicability. Nor will the cunning theories, widely advertised in support of such allegations, appear at all reasonable to the man who has familiarized himself with the main principles and facts of scientific—that is, rational—medicine.

The lists of articles presented in the following pages map out a complete course of systematic reading in medicine. A true understanding of the purely medical subjects, even in their elementary aspects, is possible only after the acquisition of some knowledge of the general biological sciences and of chemistry. Thus, human anatomy is best understood if studied in connection with comparative anatomy. Physiology is more or less obscure if studied without a preliminary knowledge of the general principles of chemistry and biology, and, again, human physiology should be studied in connection with the physiology of the lower animals. Even general botany presents a number of points of the highest interest to the student of human anatomy and physiology. Should the assiduous reader of the *Encyclopædia* desire to familiarize himself with these and cognate subjects, the present volume will readily afford the necessary guidance. We would especially call attention to the psychological articles on the special senses and faculties, without which the physiological functions of the brain and nervous system cannot be thoroughly understood. Further, a large number of chemico-physiological articles on special foods, and of articles on subjects of veterinary medicine, will be found listed in the chapter Agriculture, Horticulture, and Forestry, those articles having been prepared for the *Encyclopædia* by the food and veterinary experts of the United States Department of Agriculture.

The classification of the medical subjects proper, on which the lists below are based, and the order of sequence of the subjects in the lists themselves, are those adopted by the best medical authorities, with slight modifications to suit the distribution of subject-matter in the *Encyclopædia*. The only considerable deviations from general usage are in the case of anatomy and physiology, the two being somewhat closely interwoven in the *Encyclopædia* and therefore, here, too, arranged as one joint subject. The listed articles comprise a complete

treatment of essentials. The reader desiring more detailed information on particular bones, muscles, nerves, etc., will be guided to the special articles on such subjects by cross-references in the articles listed.

The only lists in which the order of sequence of the topics is not according to some recognized system are those under "Symptoms and Morbid Conditions" (division, Pathology and Therapeutics) and "Diseases of the Skin" (division, Diseases of the Nose and Throat, Ear, Eye, Skin, and the Genito-Urinary System). The former list comprises those symptoms and morbid conditions that are common to more than one class of diseases and that could not, therefore, be included in the somewhat rigidly classified lists preceding. On the other hand, the orders of sequence of skin diseases usually adopted in special medical works are practically useless. It was, therefore, deemed best in both cases to preserve the alphabetical order—for convenience of reference. The list of "Drugs" (division, Materia Medica) includes all the pharmacopœial preparations in frequent use. A number of rarer drugs may be found described in the articles on chemical subjects.

The biographies of famous medical men are arranged in the order of historical sequence and, together with the articles listed under "History," form a complete presentation of the history of medicine—a truly fascinating subject. Interesting historical detail will also be found in the articles on all medical topics of any importance. The inclusion of such historical articles as BATH, BARBER, EMPIRIC, DERIVATION, BLACK DEATH, PLAGUE, INOCULATION, etc., would have swelled the lists unnecessarily.

## 1. INTRODUCTORY ARTICLES.

Medical Education  
Homœopathy  
Eclectic School of Medicine  
Nurses, Training of  
Clinic  
Hospital  
Dispensary  
Ambulance  
Insane Asylum  
Bedlam  
Gheel  
Epileptic Colony  
Vital Statistics  
Sanitary Laws  
Health, Boards of  
Contagious Diseases  
Hippocratic Oath  
Medical Code

Malpractice  
Medicine

## II. ANATOMY AND PHYSIOLOGY.

### 1. *General Articles:*

Anatomy  
Physiology

### 2. *Bones, Muscles, and Ligaments:*

Bone  
Cartilage  
Marrow  
Periosteum  
Suture  
Ossification  
Skeleton  
Skull  
Spinal Column  
Rib  
Sternum

Muscle and Muscular Tissue

Tendon

Ligament

Flesh

Muscular Force

Diaphragm

Joint

Shoulder-Joint

Arm

Hand

Hip-Joint

Thigh

Knee-Joint

Patella

Leg

Foot

**3. Cavities:**

Skull

Chest

Abdomen

Pelvis

**4. Nervous System and Brain:**

Nervous System and Brain

Cerebro-Spinal Fluid

Inhibition

**5. Circulatory System:**

Circulation

Heart

Vein

Artery

Pulse

Aorta

Innominate Artery

Carotid Artery

Iliac Arteries

Blood

Blushing

**6. Respiratory System:**

Respiration, Organs and Process of

Pharynx

Larynx

Voice

Trachea

Bronchus

Asphyxia

**7. Alimentary System:**

Alimentary System

Digestion, Organs and Processes of

Food

Nutrition

Teeth

Pharynx

Salivary Gland

Œsophagus

Stomach

Pepsin

Intestine

Peristaltic Motion

Pancreas

Pancreatin

Liver

Bile

Brunner's Glands

Absorption

Colon

Cæcum

Vermiform Appendix

Rectum

Anus

Fæces

**8. Genito-Urinary System.**

Puberty

Menstruation

Climacteric Year

Reproduction

Ovary

Fallopian Tubes

Uterus

Vagina

Bartholin's Glands

Breast

Kidney

Ureter

Bladder

Urethra

Urine

9. *Special Senses:*

Nose

Eye

Ear

Tongue

Touch

10. *Ductless Glands and Lymphatic Structures:*

Thyroid Gland

Thymus Gland

Suprarenal Capsules

Pituitary Body

Spleen

Tonsil

Lymphatic

Thoracic Duct

Lacteal

Chyle

Lymph

11. *Tissues:*

Histology

Epithelium

Gland

Skin

Hair

Sweat

Nail

Scalp

Membrane

Mucous Membrane

Connective Tissue

Adipose Tissue

Endothelium

Serous Membrane

Pericardium

Pleura

Mesentery

Peritoneum

Periosteum

Muscle and Muscular Tissue

Nervous System and Brain

12. *Embryology:*

Embryology, Human

Epigenesis

Embryo

Fœtus

13. *Physiological Subjects not included Above:*

Chemistry, Physiological

Life, Mean Duration of

Rigor Mortis

Longevity

Metabolism

Animal Heat

Temperature of the Body

Sleep

Hypnoscope

Sex

Sensation

Secretion

Vivisection

Vegetarianism

III. *HYGIENE AND PROPHYLACTIC METHODS.*

Hygiene

Sanitary Laws

Sanitary Science

Health

Immunity

Quarantine

Disinfectants

Heating and Ventilation

Water Supply

Water Purification

Sewage Disposal

Food

Diet

Infants, Feeding of

Wine

Sterilized Food

Exercise

Physical Training

Bath

Vaccination

**IV. PATHOLOGY AND THERAPEUTICS.**

**1. *General Articles:***

Pathology  
Therapeutics  
Disease  
Nosology  
Disease, Germ Theory of  
Distribution of Diseases.  
Congenital Disease  
Degeneration  
Intermarriage  
Filth Disease  
Occupational Diseases  
Endemic  
Epidemic  
Infection  
Insects, Propagation of Disease  
    by  
    Bacteria  
Microscopy, (Clinical  
Toxin  
Virus  
Homœopathy  
Eclectic School of Medicine  
Christian Science  
Osteopathy  
Leeching

**2. *Specific Infectious Diseases:***

Typhoid Fever  
Relapsing Fever  
Smallpox  
Chicken Pox  
Scarlet Fever  
Measles  
Mumps  
Whooping Cough  
Influenza  
Dengué  
Meningitis  
Erysipelas  
Diphtheria  
Croup  
Septicæmia

Poliomyelitis  
Cholera  
Yellow Fever  
Black Vomit  
Plague  
Dysentery  
Malaria and Malarial Fever  
Ague  
Jungle Fever  
Malignant Pustule  
Anthrax  
Intermittent Fever  
Remittent Fever  
Hydrophobia  
Tetanus  
Trismus Nascentium  
Syphilis  
Tuberculosis  
Scrofula  
Glanders  
Actinomycosis  
Febricula  
Malta Fever

**3. *Constitutional Diseases:***

Rheumatism  
Lumbago  
Gout  
Diabetes  
Rickets  
Scurvy  
Purpura  
Hæmophilia  
Obesity

**4. *Diseases of the Alimentary System:***

Mouth, Diseases of the  
Aphthæ  
Pharyngitis  
Quinsy  
Œsophagus  
Stomach, Diseases of the  
Gastritis  
Dyspepsia



Indigestion  
Enteritis  
Gastro-Enteritis  
Cholera Infantum  
Mesentery  
Liver, Diseases of the

5. *Diseases of the Respiratory System:*

Rhinitis  
Hay Fever  
Laryngitis  
Bronchitis  
Asthma  
Tuberculosis  
Pneumonia  
Pleurisy  
Hydrothorax

6. *Diseases of the Circulatory System:*

Heart, Diseases of the  
Pericarditis  
Endocarditis  
Myocarditis  
Palpitation  
Angina Pectoris  
Atheroma  
Arterio-Sclerosis

7. *Diseases of the Blood and Ductless Glands:*

Anæmia  
Chlorosis  
Leucocythæmia  
Goitre  
Cretinism  
Myxœdema  
Basedow's Disease  
Acromegaly  
Addison's Disease

8. *Diseases of the Kidneys:*

Kidney, Diseases of the  
Bright's Disease  
Uræmia

9. *Diseases of the Nervous System and Brain:*

Neurology  
Nervous Disease  
Nervousness  
Paralysis  
Neuritis  
Sciatica  
Facial Paralysis  
Caisson Disease  
Myelitis  
Locomotor Ataxia  
Syringomyelia  
Brain, Diseases of the  
Aphasia  
Apoplexy  
Hemiplegia  
Hydrocephalus  
Paralysis Agitans  
Chorea  
Epilepsy  
Hystero-Epilepsy  
Migraine  
Neuralgia  
Facial Neuralgia  
Neurosis  
Hysteria  
Sea-Sickness  
Neurasthenia  
Hypochondriasis  
Rest-Cure  
Acromegaly  
Stammering  
Nostalgia  
Fatuity  
Imbecility  
Idiocy  
Insanity  
Delirium  
Dipsomania  
Melancholia  
Mania  
Paranoia  
Pellagra

Monomania  
 Pyromania  
 Kleptomania  
 Homicidal Mania  
 Puerperal Insanity  
 Paresis  
 Lucid Interval  
 Imitative Insanity

**10. *Parasitic Diseases:***

Parasitic Diseases  
 Worms  
 Oxyuris  
 Trichiniasis  
 Sleeping-Sickness  
 Filaria  
 Lumbricoid  
 Tapeworm

**11. *Symptoms and Morbid Conditions:***

Albuminuria  
 Amblyopia  
 Amenorrhœa  
 Anosmia  
 Aphonia  
 Arcus Senilis  
 Asthenopia  
 Bedsores  
 Breath, Offensive  
 Cachexia  
 Catalepsy  
 Catarrh  
 Colic  
 Coma  
 Congestion  
 Constipation  
 Convulsion  
 Coughing  
 Cramp  
 Crisis  
 Cyanosis  
 Degeneration  
 Diarrhœa  
 Dropsy

Ecchymosis  
 Embolism  
 Epistaxis  
 Fainting  
 Fatty Degeneration  
 Fever  
 Formication  
 Hæmaturia  
 Hæmoptysis  
 Headache  
 Heat-Stroke  
 Hectic Fever  
 Hemiopia  
 Hiccough  
 Hyperæsthesia  
 Hypertrophy  
 Insomnia  
 Jaundice  
 Knee-Jerk  
 Leucorrhœa  
 Locomotor Ataxia  
 Muscæ Volitantes  
 Nausea  
 Œdema  
 Osteomalacia  
 Oxaluria  
 Papule  
 Pectoriloquy  
 Petechia  
 Pleurodynia  
 Polydipsia  
 Pulse  
 Purpura  
 Pyrosis  
 Respiratory Sounds  
 Senility  
 Sitophobia  
 Skin Disease  
 Spasm  
 Starvation  
 Sweat  
 Symptom  
 Tenesmus  
 Thirst

Tinnitus Aurium  
 Urine, Incontinence of  
 Vertigo  
 Vomiting  
 Waxy, or Amyloid Degeneration

12. *Diagnostic and Therapeutic  
 Methods and Instruments:*

Diagnosis  
 Percussion  
 Auscultation  
 Stethoscope  
 Dynamometer  
 Axillary Thermometer  
 Temperature of the Body  
 X-Rays  
 Microscopy, Clinical  
 Laryngoscope  
 Ophthalmoscope  
 Therapeutics  
 Diet  
 Exercise  
 Movement Cure  
 Hydrotherapy  
 Massage  
 Rest-Cure  
 Transfusion of Blood  
 Venesection  
 Radium

V. SURGERY, GYNÆCOLOGY, AND OB-  
 STETRICS.

1. *General Articles:*

Surgery  
 Surgery, Military  
 Obstetrics

2. *General Surgical Pathology:*

Inflammation  
 Suppuration  
 Pus  
 Abscess  
 Boil  
 Felon  
 Carbuncle  
 Ulcer

Phagedena  
 Sinus  
 Fistula  
 Necrosis  
 Gangrene  
 Caries  
 Adhesion  
 Cicatrization  
 Bruise  
 Wound  
 Gunshot Wound  
 Dissection Wounds  
 Burns and Scalds  
 Frostbite  
 Tumor  
 Cyst  
 Hydatid  
 Actinomycosis  
 Adenitis  
 Septicæmia  
 Pyæmia  
 Shock

3. *General Surgical Technique:*

Anæsthesia  
 Antiseptic  
 Acupressure  
 Acupuncture  
 Bleeding  
 Drainage Tubes  
 Ligature  
 Suture  
 Tourniquet  
 Puerperal Fever  
 Abortion  
 Forceps  
 Embryotomy  
 Cæsarean, or Cæsarian, Opera-  
 tion  
 Leeching  
 Electricity, Medical Uses of  
 Compressed-Air Treatment  
 Respiration, Artificial  
 Resuscitation  
 Stomach-Pump  
 Cupping

Organotherapy

Serum Therapy

Antitoxin

Tuberculin

Hypnotism

Hypodermic Medication

4. *Pathology of Special Structures:*

Artery

Aneurism

Phlebitis

Varicose Vein

Thrombosis

Embolism

Nerve-Stretching

Fracture

Callus

Osteomyelitis

Periostitis

Splint

Amputation

Sprain

Synovitis

Arthritis

Housemaid's Knee

Ankylosis

Dislocation

Resection

Wen

Keloid

Chapped Hands

Bunion

Corn

Skin-Grafting

5. *Orthopædic Surgery:*

Deformities

Wry-Neck

Pott's Disease

Spine, Curvature of the

Hip-Joint

Knock-Knee

Leg

Valgus

Varus

Clubfoot

Tenotomy

Artificial Limbs

6. *Regional Surgery, Including Gynæcology:*

Encephalocoele

Concussion of the Brain

Trephine, Trephining

Rhinoplastic Operation

Harelip

Ranula

Dentistry

Laryngotomy

Tracheotomy

Choking

Mammary Gland, Diseases of

Rib, Fracture of the

Pleurisy

Empyema

Peritonitis

Gastrostomy

Umbilical Hernia

Hernia

Truss

Intussusception

Laparotomy

Vermiform Appendix

Perityphlitis

Ovary

Nephrotomy

Nephrectomy

Calculus, or Stone

Lithotriety

Lithotomy

Castration

Rectum, Diseases of the

Prolapsus Ani

Piles

Spina Bifida

Uterus, Diseases of the

Prolapsus Uteri

7. *Obstetrics:*

Obstetrics

Gestation

Superfœtation and Superfecundation

Placenta  
Puerperal Fever  
Caul  
Umbilical Cord  
Meconium  
Weaning  
Agalactia

VI. DISEASES OF THE NOSE AND  
THROAT, EAR, EYE, SKIN, AND  
THE GENITO-URINARY SYS-  
TEM.

1. *Diseases of the Nose and Throat:*

Rhinitis  
Epistaxis  
Ozena  
Polypus  
Throat, Affections of the  
Larynx, Diseases of the  
Laryngitis

2. *Diseases of the Ear:*

Ear  
Deafness  
Cerumen  
Otitis Media  
Otorrhœa  
Otalgia

3. *Diseases of the Eye:*

Eye, Diseases of the  
Blindness  
Ectropion  
Entropion  
Stye  
Trichiasis  
Conjunctivitis  
Ophthalmia  
Blepharitis  
Cornea  
Leucoma  
Staphyloma  
Iritis  
Glaucoma  
Cataract  
Retinitis  
Nyctalopia

Color-Blindness  
Optic Neuritis  
Sight, Defects of  
Myopia  
Hyperopia  
Astigmatism  
Heterophoria  
Strabismus

4. *Diseases of the Skin:*

Acarus Folliculorum  
Acne  
Alopecia  
Bromidrosis  
Corn  
Ecthyma  
Eczema  
Erythema  
Favus  
Hair  
Ichthyosis  
Impetigo  
Itch  
Leprosy  
Lichen  
Lupus  
Nævus  
Pemphigus  
Pityriasis  
Plica  
Prurigo  
Psoriasis  
Ringworm  
Rupia  
Seborrhœa  
Sycosis  
Tinea  
Vitiligo  
Wart  
Yaws

5. *Diseases of the Genito-Urinary  
System:*

Cystitis  
Calculus, or Stone  
Extravasation

Prostate Gland  
Gonorrhœa  
Stricture  
Hydrocele  
Varicocele  
Syphilis  
Circumcision

VII. MATERIA MEDICA.

1. *General Articles:*

Materia Medica  
Pharmacopœia  
Toxicology  
Prescription

2. *Preparation of Drugs:*

Tincture  
Pill  
Liniment  
Lotion  
Plasters  
Infusion  
Extract  
Percolation  
Suppository  
Unguent  
Ointment  
Elixir

3. *Classification of Drugs:*

Alterative  
Tonic  
Excitant  
Narcotics  
Sedatives  
Hypnotics  
Anæsthetic  
Anodyne  
Antipyretic  
Febrifuge  
Expectorant  
Stimulants  
Gargle  
Emetics  
Anti-Emetic  
Bitters

Antacids  
Carminatives  
Cholagogue  
Laxative  
Purgatives  
Cathartic  
Hydragogues  
Anthelmintic  
Diuretics  
Diaphoretics  
Anhidrotics  
Antispasmodic  
Astringents  
Demulcents  
Diluents  
Aphrodisiac  
Anaphrodisiacs  
Emmenagogues  
Oxytocics  
Irritant  
Rubefacients  
Refrigerants  
Depilatories  
Disinfectants  
Poison  
Antidote

4. *Drugs:*

Quinine  
Mercury, Medicinal uses of  
Iodine  
Iodides  
Bromides  
Arsenic  
Iron  
Colchicum  
Colchicine  
Salicylic Acid  
Salicylates, Medical Uses of the  
Salicin  
Sulphur, Medical Uses of  
Fern, Male  
Kamala  
Santonin  
Goa Powder

Chrysarobin  
 Phosphorus  
 Alcohol, Pharmacology, Toxicology, and Therapeutic Use  
 Absinthe  
 Hashish  
 Opium  
 Laudanum  
 Paregoric  
 Dover's Powder  
 Morphine  
 Chloral  
 Paraldehyde  
 Hypnal  
 Sulphonal  
 Trional  
 Urethane  
 Hemlock  
 Coniine  
 Curari  
 Chloroform  
 Ether, or Di-Ethyl-Ether  
 Nitrous Oxide  
 Cocaine  
 Digitalis  
 Nux Vomica  
 Strychnine  
 Strophanthus  
 Valerian  
 Sparteine  
 Aconite  
 Hellebore  
 Veratrine  
 Tobacco  
 Amyl Nitrite  
 Nitroglycerin  
 Belladonna  
 Atropine  
 Homatropine  
 Sal Ammoniac  
 Heroin  
 Guaiacol  
 Creosotol  
 Calumba

Sodium  
 Lime, or Calcium Oxide  
 Apomorphine  
 Asafœtida  
 Senna  
 Cascara Sagrada  
 Castor Oil  
 Blue Pill  
 Calomel  
 Rhubarb  
 Aloes  
 Seidlitz Powders  
 Rochelle Salt  
 Epsom Salt  
 Jalap  
 Colocynth  
 Elaterin  
 Bismuth  
 Lead  
 Lunar Caustic  
 Diuretin  
 Copaiba  
 Methylene Blue  
 Salol  
 Jaborandi  
 Iodoform  
 Carbolic Acid  
 Sulphurous Acid  
 Antipyrine  
 Phenacetine  
 Acetanilid  
 Matzoon  
 Cod-Liver Oil  
 Lanolin  
 Ichthyol  
 Salvarsan

## VIII. HISTORY AND BIOGRAPHY.

### 1. *History:*

Medicine  
 Homœopathy  
 Eclectic School of Medicine  
 Anatomy  
 Histology

Physiology  
 Hygiene  
 Pathology  
 Disease, Germ Theory of  
 Therapeutics  
 Surgery  
 Surgery, Military  
 Obstetrics  
 Dentistry

**2. Biography:**

Hippocrates  
 Galen, or Claudius Galenus  
 Aretæus  
 Avicenna  
 Linacre, or Lynaker, Thomas  
 Paracelsus  
 Fracastoro, Girolamo  
 Fallopio, or Fallopius, Gabriel  
 Vesalius, Andreas  
 Eustachio, Bartolommeo  
 Paré, Ambroise  
 Fabricius, or Fabrizio, Girolamo  
 Harvey, William  
 Sydenham, Thomas  
 Pecquet, Jean  
 Graaf, Regnier de  
 Willis, Thomas  
 Malpighi, Marcello  
 Radcliffe, John  
 Leeuwenhoek, Antonius van  
 Boerhaave, Hermann  
 Hoffmann, Friedrich  
 Sloane, Sir Hans  
 Morgagni, Giovanni Battista  
 Swieten, Gerard van  
 Haller, Albrecht von  
 Pott, Percival  
 Brown, John  
 Cullen, William  
 Hunter, John  
 Perkins, Elisha  
 Auenbrugger, von, or Auen-  
 brugg, Leopold

Mesmer, Franz, or Friedrich-  
 Anton  
 Bell, John  
 Jenner, Edward  
 Baillie, Matthew  
 Pinel, Philippe  
 Post, Wright  
 Gall, Franz Joseph  
 Soemmering, Samuel Thomas  
 von  
 Scarpa, Antonio  
 Spurzheim, Johann Kaspar  
 Hufeland, Christoph Wilhelm  
 Physick, Philip Syng  
 Broussais, François Joseph  
 Victor  
 Ling, Pehr Henrik  
 Esquirol, Jean Etienne Domi-  
 nique  
 Cooper, Sir Astley Paston  
 Larrey, Dominique Jean  
 Bell, Sir Charles  
 Hahnemann, Samuel  
 Dieffenbach, Johann Friedrich  
 Wells, Horace  
 Morton, Samuel George  
 Priessnitz, Vincenz  
 Beaumont, William  
 Orfila, Matthieu Joseph Bona-  
 venture  
 Graves, Robert James  
 Ennemoser, Joseph  
 Magendie, François  
 Warren, John Collins  
 Amussat, Jean Zuléma  
 Hall, Marshall  
 Bright, Richard  
 Müller, Johannes  
 Forbes, Sir John  
 Francis, John Wakefield  
 Wagner, Rudolph  
 Mott, Valentine  
 Quain, Jones  
 Lawrence, Sir William



- Flourens, Marie Jean Pierre  
Goodsir, John  
Morton, William Thomas Green  
Syme, James  
Simpson, Sir James Young  
Parrish, Edward  
Holland, Sir Henry  
Winslow, Forbes (Benignus)  
Andral, Gabriel  
Rokitansky, Karl, Baron  
Bernard, Claude  
Peaslee, Edmund Randolph  
Long, Crawford W.  
Wood, George Bacon  
Taylor, Alfred Swaine  
Seguin, Edouard Onesimus  
Broca, Paul  
Sims, James Marion  
Parker, Willard  
Gross, Samuel D.  
Draper, John Christopher  
Post, Alfred Charles  
Flint, Austin  
Kneeland, Samuel  
Gray, John Perdue  
Quain, Richard  
Langenbeck, Bernhard Rudolph  
von  
Parker, Peter  
Bright, Richard  
Ricord, Philippe  
Taylor, Isaac Ebenezer  
Owen, Sir Richard  
Earle, Pliny  
Mackenzie, Sir Morell  
Peters, John Charles  
Moleschott, Jacob  
Charcot, Jean Martin  
Brown-Sequard, Charles Edouard  
Pasteur, Louis  
Tuke, Daniel Hack  
Loomis, Alfred Lee  
Dubois-Reymond, Emil Heinrich  
Kneipp, Sebastian  
Lusk, William Thompson  
Quain, Sir Richard  
Hart, Ernest Abraham  
Pepper, William  
Seguin, Edward Constant  
Paget, Sir James  
Taylor, Charles Fayette  
Hammond, William Alexander  
Virchow, Rudolph  
Kussmaul, Adolph  
Thomas, Theodore Gaillard  
Davis, Nathan Smith  
Thompson, Sir Henry  
Esmarch, Johannes Friedrich  
August von  
Guernsey, Egbert  
Lister, Sir Joseph  
Emmet, Thomas Addis  
Mitchell, Silas Weir  
Jacobi, Abraham  
Turner, Sir William  
Recklinghausen, Friedrich von  
Flint, Austin, Jr.  
Smith, Andrew Heermance  
Sternberg, George Miller  
Carpenter, William Benjamin  
Hansen, Gerard Henrik Armauer  
Janeway, Edward Gamaliel  
King, Albert Freeman Africanus  
Wood, Horatio Curtis  
Rayleigh, John William Strutt,  
Baron  
Koch, Robert  
Laveran, Charles Louis Alphonse  
Morton, William James  
McBurney, Charles  
Trudeau, Edward Livingston  
Morselli, Enrico Agostino  
Spitzka, Edward Charles  
Lorenz, Adolph  
Starr, Moses Allen .  
Horsley, Victor Alexander Haden  
Peterson, Frederick  
Manson, Patrick

Flexner, Simon  
Ehrlich, Paul  
Wassermann, August von  
Carrel, A.  
Sullstrand, Allwar  
Tiedemann, Friedrich  
Mayo, Charles Horace  
Mayo, William James

Richet, C. R.  
Kossel, Albrecht  
Behring, E. A. von  
Ross, Sir R.  
Metchnikoff, E.  
Ramón y Cajal, S.  
Pavlov, I. P.  
Finsen, N. R.

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# Chapter 33. Manners and Customs

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## Dress and Apparel

**N**OWHERE more than in the apparel of men and women does time wreak its changes and the spirit of an age stand out. The student of the manners and customs of a people or period often may apply himself with profit to a consideration of their garments, and conversely in a study of the garments reflex actions on the wearer may be observed. Indeed, clothes may be subject to the dictates of a fickle fashion or possess a spiritual and deep-lying significance, as in the case of ecclesiastical vestments, or changing from the decorative to the more serviceable, as in the case of the military or naval uniform.

Thus costume in itself may possess a significance more than merely for the interest of the votary of fashion. For such a student a series of articles might be recommended embraced in the following list:

Costume  
Dress  
Textiles  
Dress Reform  
Armor  
Fashion  
Embroidery  
Corset  
Crinoline  
Girdle  
Glove  
Hosiery  
Mantle  
Shawl  
Hair Dressing

Beard  
Cosmetics  
Rouge  
Perfumery  
Wig  
Hat  
Headdress  
Shoes  
Boots  
Jewelry  
Parasol  
Uniforms, Military and Naval  
Costume, Ecclesiastical  
Degree (for Academic Costume)

## Jewelry

Among the minor arts in none have there been more important developments than in the artistic design and fabrication of jewelry. In many fields there may be considered to have taken place within recent years a return to the artistic products of the early gold- and silver-smiths of Continental Europe, while in the cutting and setting of

gems there has also been opportunity for the display of the skill of the lapidary and the jeweler, who have evolved new styles of cutting and forms of settings.

Under the broad heading of JEWELRY in this section can be considered the articles for personal adornment, involving the use of precious and semi-

precious stones and the careful working of such metals as gold and silver, and also the manufacture of objects of utility and ornament of a somewhat larger description, such as tableware and the artistically decorated porcelain and other objects of art.

The visitor to a museum of fine arts would often find grouped in a single department such articles as are embraced in the following list, which is submitted for the guidance of the reader:

Jewelry  
Fan  
Enamel  
Embossing  
Gems  
Goldsmith Work  
Inlaying  
Lacquer Work  
Lapidary Work  
Japanese Art  
Marquetry  
Metal Work  
Pearl  
Plate  
Porcelain  
Pottery  
Plated Ware  
Repousée  
Ring  
Stained Glass  
Table Ware  
Tarsia Work  
Fork  
Cutlery

In connection with jewelry, it is desirable to refer also to the various gems which are used for personal adornment. The article **GEMS**, which discusses the general qualities of precious or beautiful stones, with partic-

ular reference to those cut or engraved for use as jewels or seals, describes the history of such ornaments from the earliest periods of Egypt. This is followed by an article on **GEMS, IMITATION AND ARTIFICIAL**, in which are discussed the various imitations ranging all the way from crude affairs of glass to modern triumphs of the chemist, involving the electric furnace as a means of producing the gems artificially or synthetically.

While precious stones used for gems may have considerable value, due to their rare occurrence in nature, it is the lapidary who, in his cutting, grinding and polishing the various crystals or other precious stones, adds to their value or even, in some cases, gives beauty and value to stones whose intrinsic value is but small. Accordingly, the article **LAPIDARY WORK** should be read in addition to that on gems, and then the reader can take up the series of articles on the precious stones themselves—naturally headed by the diamond. These arrange themselves into two groups—those of great rarity and value, as follows:

Diamond  
Emerald  
Ruby  
Sapphire  
Amethyst  
Opal  
Carnelian  
Turquoise  
Topaz

The second group comprises many, mostly crystalline minerals, that are also considered as precious, but whose rarity is not such as to put them in

the same class with the list just given.

Such minor stones would be:

Corundum

Quartz

Beryl

Chrysoberyl

Aquamarine

Tourmaline

Alabaster

Chalcedony

Sardonyx

Argonite

Agate

Jasper

Chrysolite

Garnet

Rhodonite

Chrysocolla

Catlinite

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## Chapter 34. Games and Sports

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**A**LL peoples indulge in exercises of strength, of skill, of bodily and mental agility, or of fortune, and often these mimic the more serious pursuits of life, or consist in these very pursuits indulged in for pleasurable purposes only.

1. The capture and slaying of animals has remained a source of pleasure long after it has ceased to be the chief business of life. See:

(a) Shooting

Archery

Trapping

Coursing

Battue

Tiger-hunting

Still-Hunting

Fox-hunting

Falconry

Game Laws

Game Preserves

(b) Angling

Bait-fishing

Salmon-fishing

Trolling

Trout-fishing

Fly-Casting

2. The mimicry of war is also found in contests between men or animals, or men and animals. See:

Pugilism

Boxing

Wrestling

Fencing

Cock-fighting

Bear-baiting

Bull-fight

3. Water, both in its common state and in the forms of ice and snow, furnishes many forms of sport to primitive and civilized man. See:

(a) Swimming

Rowing

Canoe and Canoeing

Yachting

Water Polo

(b) Skating

Ice Polo

Ice Yachting

Curling

(c) Snowshoeing

Skiing

4. Useful to man in labors, the horse is his great companion in numerous sports. See:

Horsemanship

Coaching

Driving

Trotting

Pacing

Horse-racing

Stud-book

Derby Day

Steeple chasing

Polo

Hippodrome

5. Of the instruments entering into popular games, the ball, in various shapes, is by far the most common and the most widespread. See:

Bowls

Baseball

Indoor Baseball

Cricket

Golf

Croquet

Hockey

La Crosse

Polo

Football

Basketball

Handball

Pelota

Racquets

Tennis

Lawn Tennis

Court Tennis

Ping-Pong

Billiards

Bagatelle

6. In games of chance, the card and the die in varying forms are universally found. In the case of cards, however, chance often plays the minor part and the game assumes a highly intellectual character. See:

(a) Cards

Whist

Bridge

Pinochle

Skat

Ecarté

Piquet

Bezique

Cribbage

Euchre

Solitaire

Poker

Baccarat

Rouge et Noir

Fan-tan

(b) Dice

Hazard

Craps

(c) Roulette

7. For the great intellectual games par excellence, see:

Chess

Checkers

and for cognate games:

Backgammon

Dominoes

8. Miscellaneous sports and games:

Cycling

Mountain Climbing

Coasting

Toboggan

Shuffleboard

Quoits

9. The general subject is treated under:

Athletics

Gymnastics

Physical Culture

Amateur

Handicapping

Sports, Book of

Games, Ancient

Gymkhana

Olympic Games

Pythian Games

Nemca

Gladiator

Circus

Acrobat













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